LIBRARY OF CONGRESS
OCT 6 1891
SMITHSONIAN DEPOSIT

THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME LV.—No. 14. Whole No. 852. | NEW YORK, MONDAY, OCTOBER 5, 1891. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y. AS SECOND CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $4.50 (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

Remittances should be made either by post-office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Collections are invariably made directly from this office, for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

The **American News Company,** Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICES—
- Nineteenth Annual Meeting, American Gas Light Association..... 469
- Transportation Circular..... 470

EDITORIALS—
- Obituary—Samuel Prichitt..... 471
- The Secretary's Announcements..... 471

Special Western Correspondence..... 471
*Shops of the Berlin Iron Bridge Company..... 472
*A Meter Registering Device..... 474
The Storage of Coal in Gas Works, by Mr. D. Irving..... 475
Some Details of the Care and Management of an Arc Lighting System, as Practiced in the Municipal, of St. Louis, Mo., by Mr. J. L. Ayer..... 476
Petroleum in Marine Furnaces..... 478
Labor-Saving Machinery..... 478
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 479

A Fuel Gas Hint from St. Joseph, Mo.—Betterments at the Fitchburg (Mass.) Works—Gas Coal Prices, Wheeling, West Va.—Resignation of Mr. C. N. Dinsmore—A Big Shipment by the Berlin Iron Bridge Company—Damage Suit—They Ask for Cheaper Gas—Public Lighting, Geneseo, N. Y.—Bought in by the Louisville Gas Company—Public Lighting, Milwaukee, Wis.—To Absorb the Troy (N. Y.) Electric Light Company—A New Holder—The Economic Company Scares the Drakes—Resolutions in Memory of Samuel Prichitt—Public Lighting, Modesto, Cal.—Harry Hoadley Goes to Cumberland, Md.—The Directors of the Greenfield (Ind.) Natural Gas Company—Explosion of Gas—The Toledo Company Not Afraid to Show its Books.

New Process for Toning Blue Prints..... 481
The Market for Gas Securities..... 482

☞ ☜ Mr. Fred. Persons, who has charge of the arrangements under which the members of the American Association who propose to attend the New York convention will come on by special car from Chicago, Ills., desires us to say that he can be communicated with in regard to the trip at his Chicago address, No. 75 North Clinton street. It is desirable that word be sent him at as early a date as possible.

[OFFICIAL NOTICE.]

Nineteenth Annual Meeting of the American Gas Light Association.

EXTRACT FROM THE CONSTITUTION.—"SEC. 12. *Application for Active Membership, or for Associate Membership, or for transfer from Associate to Active Membership, must be received by the Secretary at least ten days prior to the meeting at which the application is acted on.*"

The nineteenth annual meeting of the American Gas Light Association will be held in New York, on October 21, 22 and 23. The headquarters will be at the Holland House, Fifth Avenue and 30th street.

The members will be called to order on the morning of Wednesday, October 21st, at 10 o'clock, by the President, John P. Harbison, Esq.

The following papers are promised:

1. "Leakage," by C. H. Nettleton, Birmingham, Conn.
2. "Meter Rent, a Question of Policy," by Walton Clark, Philadelphia, Pa.
3. "The Illuminating Power of Mixture of Coal and Water Gases," by Dr. E. G. Love, New York.
4. "Theoretical Effect of Preheating Blast, Steam and Oil in Water Gas Manufacture," by Rollin Norris, Philadelphia, Pa.
5. "Lime," by Dr. A. W. Wilkinson, New York.
6. "Intensity of Light," by A. B. Slater, Jr., Providence, R. I.
7. "Manipulation of Tar from Carbureted Water Gas," by David Douglas, Savannah, Ga.

It would seem that there may be a little more than the usual amount of time to devote to the discussion of material collected in the "Question-Box." Members will please send in to the Acting Secretary, in advance, any questions they wish to submit to the meeting, through this channel. The statement of recent personal experiences and difficulties might offer good material for this purpose, and might lead to valuable discussions.

The meetings of the Association will be held in Scottish Rite Hall, corner 29th street and Madison Avenue.

The attention of members is called to the bulletin board, which will be placed in rotunda of Holland House. Notices in regard to the meeting, and especially changes in and additions to the printed programme will be posted thereon, and it will, therefore, be well for the members to consult it from time to time.

As much valuable time is usually lost in calling the roll, and as but an inaccurate list is thus obtained of the members present, it is proposed this year to follow the method inaugurated at the Savannah meeting, by having the members hand in their names to an attendant as they enter the meeting room for the first time. A special blank card has been adopted for this purpose, and these cards with pencils will be handed to members outside the Hall door. Members will please write thereon their names and addresses.

The Committee of Arrangements is providing for the entertainment of the members during the time that they are not occupied with the business, which is the prime object of the meeting. The pleasure of the ladies will, as usual, be carefully provided for. No full programme has yet been furnished the Acting Secretary, but he is able to announce a banquet to be tendered the members by the local Gas Companies, on the

evening of Thursday, the 22d, at the new and palatial club house of the Manhattan Athletic Club, and a river excursion for the members and the ladies on Friday, the 23d. An informal hop for one of the evenings has also been under consideration.

Members wishing to provide for comfortable hotel accommodations, should remember that New York is full of visitors at the time selected for this meeting, and, therefore, they should engage rooms well in advance. The Holland House has given a special rate of $2.00 per day, and upwards, according to the character of the room. This is for rooms only, the hotel being conducted on the European plan. This hotel is the new house of "Bishop" Kinsley, of Chicago, so well known to many gas men. The Holland House will not be able to accommodate all the members, and, therefore, for the information of those not familiar with New York, the following hotels, all fairly convenient to the headquarters, are mentioned: Gilsey, Sturtevant, Coleman, Ashland, Grand, Grand Union, Bartholdi, Westminster, Brunswick, Hoffman, St. James, Fifth Avenue. There are many others within convenient distance. The Committee announces that no special rates can be obtained at any of these houses; the regular rates vary, and some of the members may prefer to correspond with a number of these houses before selecting. Each of the houses named will afford thoroughly comfortable accommodations.

To lessen the chance of confusion, the question of transportation is dealt with in a separate circular, enclosed.

The Acting Secretary is instructed by the Council to call the especial attention of members whom it may concern, to Sec. 51 of Constitution, printed below.

"SEC. 51. *No member who owes two years' dues shall be entitled to vote, or to participate in the deliberations of the Association, or to receive a copy of the proceedings.*"

This provision of the Constitution will be enforced at the coming meeting.

The Acting Secretary also respectfully calls to the attention of those whom it may concern, part of Sec. 52, which reads:

"Any members whose dues shall remain unpaid for a term of 3 years, may be dropped from the roll of membership by a vote of the Council."

The Acting Secretary is sorry to find that unless the payments received between now and the time of meeting render it unnecessary, he will be obliged to report to the Council a number of names that he feels sure are only on this list through inadvertence on the part of the members.

Dues are payable in advance. If not already attended to, will the members please remit for their dues, before laying this circular aside?

Transportation.

The following Passenger Associations have granted the usual concession in railroad rates, namely: The Trunk Line Association, composed of the following railroads: Addison & Pennsylvania; Allegheny Valley; Baltimore & Ohio (Parkersburg, Bellaire and Wheeling, and east thereof); Baltimore & Potomac; *Bennington & Rutland; Buffalo, Rochester & Pittsburg; Camden & Atlantic; Central of New Jersey (except locally between Philadelphia and New York); *Central Vermont; Chesapeake & Ohio (east of Charleston, W. Va.); Cumberland Valley; Delaware & Hudson Canal Co.; Delaware, Lackawanna & Western; Elmira, Cortland & Northern; Fall Brook Coal Co.; *Fitchburg; *Grand Trunk; Lehigh Valley; N. Y. Central & Hudson River; N. Y., Lake Erie & Western (east of Salamanca and Buffalo); N. Y, Ontario & Western; N. Y., Philadelphia & Norfolk; Northern Central; Pennsylvania (except locally between Philadelphia and New York); Philadelphia & Erie; Philadelphia & Reading (except locally between Philadelphia and New York); Philadelphia, Wilmington & Baltimore; Rome, Watertown & Ogdensburg (except on Phœnix Line—between Syracuse and Oswego); Western N. Y. & Pennsylvania; West Jersey; West Shore; Wilmington & Northern.

The New York and Boston lines, between the two places named, viz.: Boston & Albany Railroad; N. Y. & New England; N. Y., New Haven & Hartford; N. Y., Providence & Boston; Old Colony; Fall River Line; Norwich Line; Providence Line; Stonington Line.

The Southern Passenger Association, composed of the following companies: Atlantic Coast: Atlanta & West Point; Brunswick & Western; Charleston & Savannah; Central Railroad of Georgia; Georgia Railroad; Georgia Pacific; Norfolk & Western; Pennsylvania Railroad (lines south of Washington); Port Royal & Augusta; Raleigh & Gaston; Richmond & Danville; Richmond, Fredericks & Potomac; Savannah, Florida & Western; Seaboard & Roanoke; Shenandoah Valley (lines south of Potomac river); South Carolina Railway; Western & Atlantic Railroad.

The Central Traffic Association, covering the following ground: Bounded on the east by Pittsburgh, Salamanca, Buffalo and Toronto; on the north by the line of and including points on the Grand Trunk Railway, from Toronto to Port Huron, thence via Lakes Huron and Michigan to the north line of Cook county, Ills.; on the west by the west line of Cook county and the Illinois and Mississippi rivers, to Cairo, including Burlington, Keokuk, Quincy, Hannibal and St. Louis; and on the south by the Ohio river, but including points on either side of that river.

The Western Passenger Association, covering territory west of Chicago and St. Louis, declines to grant any concession on account of the probable limited attendance from this territory. Members interested are referred to the 5th rule below, under which they can secure special rates from Chicago and St. Louis. (The Chicago & Alton Railroad, operating in this territory, individually grants concession as herein described, from all points in Illinois to Chicago or Bloomington.)

The usual concession in railroad rates has been granted, namely, one-third off on the round trip. That is, members will pay full fare going, obtain a certificate from the ticket agent from whom they purchase their tickets, and, upon presentation of this certificate at New York, duly endorsed by Acting Secretary, they can obtain the return ticket at one-third the full fare rate. To illustrate: Suppose the regular fare from some point to New York to be $30. At the time of purchasing his ticket to New York the member pays $30 and obtains the necessary certificate from the agent; he has that endorsed by Acting Secretary, at New York; then, on presentation of the same to the ticket agent at New York, he can procure a return ticket by payment of only $10.

The following extracts from the regulations of the railroads are cited for the information of the members. *The special rates are granted subject to these regulations:*

1.—The American Gas Light Association is obliged to guarantee to redeem at full fare rates any return tickets procured by persons in attendance at meeting which may afterwards be found in the hands of "scalpers."

2.—The reduction is conditional on there being an attendance at the meeting of not less than 100 persons *holding certificates.*

3.—Each person to obtain the excursion rate must purchase a first-class ticket (either limited or unlimited) to the place of meeting, for which he will pay regular fare, and upon request, the ticket agent will issue a printed certificate of purchase of the standard form. Agents at all important stations are supplied with certificates.

4.—If through tickets cannot be procured at the starting point, purchase short trip ticket to the most convenient point where such through tickets can be obtained, and there purchase through to place of meeting, requesting a certificate from the ticket agent at the point where second purchase is made.

5.—Tickets for the return journey will be sold by the ticket agents at the place of meeting at one-third the highest limited fare, only to those holding certificates signed by the ticket agent at point where through ticket to place of meeting was purchased, and countersigned by signature written in ink by the Acting Secretary of the Association, certifying that the holder has been in regular attendance at the meeting.

6.—No reduction of fare will be made on the return passage if the going ticket is purchased more than three days before the opening date of the meeting; except that when meetings are held at distant points to which the authorized limit is greater than three days, tickets may be purchased before the meeting in accordance with the limits shown in regular tariffs.

7.—Certificates are *not transferable*, and return tickets secured upon certificates are *not transferable.*

8.—The certificate of agent at starting point, duly endorsed by Acting Secretary of Association, must be presented to ticket agent at place of meeting, *within* three days (*Sunday excepted*) after adjournment of meeting. The return ticket will be for the line or lines covered by the going ticket.

9.—No refund of fare will be made on account of any person failing to obtain a certificate.

Important.—Be sure to obtain your railroad certificate when buying your ticket for New York; apply for ticket and certificate at least 30 minutes before train time; be sure to have the Acting Secretary endorse your certificate at New York; apply for return ticket at least 30 minutes before train time, and have your certificate with you; members will please hand their certificates to the Acting Secretary, or his clerk, upon arrival at place of meeting; *if there are* 100 members present, holding certificates, each certificate will then be properly endorsed and handed back to owner, before adjournment; keep this circular in your pocket, and apply to it if you are in doubt.

ALEX. C. HUMPHREYS,
Drexel Building, Philadelphia, Pa. Acting Sec'y.

* Only for business orig nati g at, or destined to, stations on the direct lines of these roads between Troy, N. Y., and Montreal, Canada.

OBITUARY—SAMUEL PRICHITT.

As stated in our last issue, Mr. Samuel Prichitt, President of the Nashville (Tenn.) Gas Light Company, died, at his home in Nashville, at an early hour of the morning of September 21st. While Mr. Prichitt had for several years suffered from the effects of a stroke of paralysis, his courage was such that he insisted on keeping pace with the day and time in respect to business routine and its cares. So, albeit a sufferer from disease, those around him, becoming accustomed to the seeming paradox, forgot his symptoms in their observation of his methodical and active business ways. The ending was sudden, as may be judged from the fact that only the day before he enjoyed his usual ride and etired to bed without complaining. Mr. Prichitt, who was born in southern New Jersey, in 1817, from parents who could not endow him with the traditional silver spoon, at an early age determined to try his fortune in Philadelphia, where he learned the tailoring trade. In 1838 he removed to Nashville, under engagement to take employment with Washington Meredith, as cutter—Meredith clad the gilded youth of Tennessee and Kentucky a half century ago. Prospering fairly well, young Prichitt (in 1840) opened an establishment in partnership with Jacob Milliron, buying out the latter's interest in the succeeding year and carried on the business with unvarying success, until 1864, when he retired from the counter and its cares. It must not be inferred that deceased meanwhile neglected to increase his wealth by failing to take advantage of the opportunities afforded by the great growth of the West and South. Careful investment, fostered by patient watchfulness and temperate habits, brought its inevitable result. When the Nashville Gas Company was chartered (1850), deceased and the late Mr. Barrow were among the prime movers in its organization, Mr. Prichitt, if we mistake not, serving on the first Board of Directors. He always took a lively interest in its welfare, and was chosen its President, in 1881, succeeding Mr. Samuel Watkins in the chief executive position. The history of the Company is a record of success, and it is not asserting too much to say that Mr. Prichitt's zealous care contributed greatly thereto. He was elected to membership in the American Gas Light Association, at the third semi-annual meeting (Washington, D. C., May 12, 1875), and was a constant attendant at its sessions, until chronic illness made protracted travel dangerous. He became a member of the Western Gas Association at its sixth annual session (Cincinnati, Ohio, May, 1883), and served on its Board of Directors for one term—1883-4. He was very popular with the Western membership, and his fealty to them and their affection for him were prettily shown at the Louisville meeting last May when his appearance in the convention, with halting step, was hailed with applause born of spontaneity. Deceased was a valued member of the Nashville Merchants Exchange, President of the Tennessee Manufacturing Company, and a Director or other officer in prominent companies, the naming of which separately would be of no particular moment now. He was closely identified with the leading banking interests of the South and Southwest, and altogether was a man of vast business cares, in strange contrast with the humble beginning of his career. No word was truer than that spoken by Samuel Prichitt, and amid all his responsibilities, the disfiguring touch of broken faith was never put upon him.

In 1844 Mr. Prichitt was united in marriage to the eldest daughter of Mr. T. B. Coleman, who was at the time Mayor of Nashville. Their home life was, as his public career, felicitous and worthy, and from it survive two sons, Clark and Samuel, Jr. The funeral services were held at his late home, on Demonbreun street (where he had resided for upwards of 40 years), on the afternoon of the 22d inst., and thus was brought to a close the career of a man who, through a long and eventful life, was armed in honor undimmed by the tarnish or taint of hypocrisy.

THE SECRETARY'S ANNOUNCEMENTS.

Mr. Humphrey's announcements regarding the meeting of the American Association are given in full with this issue, and from them the members can ascertain what they are about to receive. The paper list is full of promise, in that the seven numbers outlined are on subjects and from pens that insure novelty and guarantee well prepared matter. The hints about hotel accommodations are timely and should not only be remembered but acted upon at once. The transportation announcement carries its own story, and those who practice its recommendations will put money in their purse. The Acting Secretary certainly has put his house in order on very short notice.

THE Little Falls (N. Y.) Gas Light Company offers to light the city's streets with arc lamps, at the rate of 27.4 cents per lamp per night.

SPECIAL WESTERN CORRESPONDENCE.

By SUNSET.

Dear JOURNAL:—The great event of the fortnight was the birth of "The Gas Club of Chicago." Promptly at the appointed hour some 25 whole souled local and suburban gas men came together at the Grand Pacific and proceeded to business. It was a good gathering of good men. Genial Ed. Cowdery left his holder afloat in Milwaukee and ran down to take it in; Uncle Jerry Howard's face shone and eyes twinkled; Stratton, of Valparaiso, Ind., paired off with Hume. of Macomb, Ills. (who came 210 miles), while Yuille, of the new Economic, and Fitz, from Elgin, Ill., were resplendent in the bald head row. Booth, formerly with Geo. Shepard Page, came around for old acquaintance sake; Shelton, Morrell, and Moses represented the local construction companies, while jolly Fred. Persons was ably backed by Roper, Martin, Thuman, Felt, and numerous other local men. Handsome Carl Bradley, President of the Bouton Company, also appeared, and Messrs. S. Gibbs and Westcott, engineers with the United Gas Improvement Company, by chance in the city at the time, came around to enjoy the proceedings.

Mr. Persons opened by announcing the object of the meeting, and called Mr. Cowdery to the chair—suggesting that practice at presiding would stand him in well for the next Western Gas Association meeting. Mr. Shelton, as Temporary Secretary, gave an account of the work of the preliminary committee, and read some 50 letters from local and surrounding gas men in hearty favor of the project, and reported no dissenting opinions to date. Extracts from the AMERICAN GAS LIGHT JOURNAL favoring the project were read, backed up by a quotation from the London *Journal of Gas Lighting*, wherein was said, "It strikes us as eminently desirable; and we could wish that London had its Gas Engineers Club, based on the model proposed for Chicago."

The first question discussed was the name to be adopted. "Associated Chicago Gas Men" was objected to as too long and somewhat harsh; "Guild" was suggested but deemed inexpedient, as the policy of the organizers is broad enough not to confine to gas engineers or managers solely; "Association" was rejected, as it was not desired to trespass by name or otherwise in the sphere of the regular Associations. The suggestion of "Alliance" was promptly voted down by a combination of the rural members, while "Columbian" and "Garden City" were likewise decided against. Finally "The Gas Club of Chicago" was unanimously approved and adopted as euphoniously and exactly expressing what the organization is.

The scope and policy of the Club, then discussed, resulted in the decision that the Club should meet at intervals of about one month (at the discretion of the committee), for social enjoyment; for the discussion of live current and local gas topics; for the inspection of gas works and gas processes in the neighborhood; for the consideration of any gas papers or lectures that may be arranged for by the Club; and for the holding of dinners during the winter as may be decided upon.

To carry this out a committee (consisting of Messrs. Harper, Morrell, Stout, Moses, and Felt) was appointed, whose duty it is to arrange for the above, and to notify, in advance, the members of date, place of meeting, and the entertainment in each case to be provided.

As the Club progresses and gains momentum it is expected to engage permanent rooms for its headquarters; but for the coming winter it was voted to hold the meetings at places to be chosen by the committee.

A second committee (consisting of Messrs. Shelton, Persons, Howard, Yuille, and Fitz), to draw up by-laws and report next meeting, was appointed, with instructions not to make said by-laws "top heavy." The same committee will return nominations for officers, and recommendations as to annual dues, etc.

The meeting then adjourned. From end to end it was thoroughly promising. The attendance, both of local and suburban members, for a first meeting, was in excess of the expectations of the committee. Many men, who were unavoidably absent, are known to be in hearty accord with the project. The letters read—from Secretary Littleton, of the Western Association, from President Wilkiemeyer, of the Ohio, and from many others—were of the warmest kind; and the interest shown by all members present was all that could be desired.

A long and successful life to The Gas Club of Chicago do I wish and predict.

The exact list of "Charter Members" present at the formation of The Gas Club of Chicago is as follows:

Booth, C. E., Chicago.	Felt, D. E., Chicago.
Bradley, Carl, Chicago.	Fitz, R. F., Elgin.
Cowdery, E G., Milwaukee.	Gibbs, Silas, Phila.
Eaton, A. B., Chicago.	Howard, J. B.. Chicago.

Hume, J. M., Macomb.	Shaw, A. E., Chicago.
Jackson, C. H., So. Chicago.	Stratton, J. W., Valparaiso.
Martin, W. P., Chicago.	Shelton, F. H., Chicago.
Morrell, E. E., Chicago.	Smith, W. E., Chicago.
Moses, F. D., Chicago.	Thuman, F., Chicago.
Morava, W., Chicago.	Wanlis, Thos., Chicago.
Persons, Fred., Chicago.	Wanlis, J. M., Chicago.
Roper, Geo., Rockford.	Westcott, J. T., Phila.

Yuille, Geo., Chicago.

All gas men in the vicinity are sorry to learn of the financial trouble of the Van Wie Gas Stove Company. I have it from the inside, however, that the trouble will probably be but temporary. It is said that the assets are sufficient to pay dollar for dollar, and business at the old stand will probably be resumed in due time. The name of the Company, though, will likely be changed to the "Eclipse," after the well-known pattern of stove so speedily pushed to the front by the management.

The local Chicago gas fight is quiet for the moment. The Economic, to date, has 16 miles of pipe laid—not bad, considering they only started to work on Aug. 13.

The newspapers still scintillate in brilliant (?) digs at the combatants, and the poetasters of the daily newspapers are evolving mongrel lines galore over the situation. And that the matter has permeated the public is shown by the fact that a farce-comedy, entitled "Natural Gas," advertised not long since, "Our prices are cheaper than the Economic—viz., only 25, 35, 50 and 75 cents." Perhaps the cleverest dig was the following, from an editorial commenting upon the formation of the new Gas Club:

"It is rumored that the first official act of the Club will be the appointment of a discreet committee of three to undertake an amicable division of that $7,500,000 between Messrs. Yerkes, Kent, et al., and Messrs. Jerzmanowski, Billings, et al. It is said, also, that in order to prevent unhappy dissensions of this nature in the future the committee on by-laws will make article 1 read as follows:

"'When any gas men banded together for mutual profit have made a play and pocketed the stake or swag accruing therefrom, it shall be unlawful for any other gas men similarly banded together to question such pocketing of the stake in any court or any newspaper, or to seek to gain possession of any part thereof in any manner except by manipulation of stocks or in the regular way of the game.'"

I learn that Mr. C. M. Higgins, the popular oil man from Cleveland, is soon to be lost to the West, as he goes to New York, to be located hereafter at the Standard Oil headquarters. If it is upward for him as well as Eastward, we are content.

Shops of the Berlin Iron Bridge Company.

In the designing and construction of manufacturing plants the three great objects to be kept in view are: First, to reduce the cost of manufacturing the product to the absolute minimum; second, to reduce the cost of maintenance and repairs to the absolute minimum; and third, it should be so designed and constructed as to reduce the first cost of building to the absolute minimum.

Many manufacturing concerns reverse this order and reduce the first cost of building to the absolute minimum, without regard to economy of maintenance or of manufacture. While this is somewhat desirable in preparing for the manufacture of a class of goods, the profits on which are large, and when one's capital is limited, since it permits that in time the cheap wooden buildings may be removed and modern brick and iron buildings substituted, nevertheless, if the reduced cost of maintainance and of manufacture be taken into account, as the result of complete construction at the outset, the saving would in the end be found to pay a very large interest on the original cost of the better class of construction.

No company in this country has probably had as large experience in the designing and construction of manufacturing plants as the Berlin Iron Bridge Company, of East Berlin, Conn., and this knowledge prompts us to present to our readers some illustrations showing the character of the plant, which they have lately built at East Berlin, Conn., for their own work, which is probably the best designed and equipped for all kinds of structural iron work of any plant to be found in this country.

The old plant of the Berlin Iron Bridge Company is situated on the west side of the Mattabesset river, in the town of Berlin, Conn., and comprises about five acres of land well covered with buildings; but, like a large class of other manufacturing plants in this country, the buildings were originally designed for only a limited amount of product, and as the business of the Company has extended from year to year, additions have been made until the original buildings have sunk into insignificance, and the "additions" in reality comprise the greater portion of the plant. Owing to the limited amount of land available the Company decided to build the new plant on the east side of the Mattabesset river, in the town of Cromwell, to be connected with the old plant by an iron bridge of sufficient capacity, not only to carry the narrow gauge cars which move the material about the premises, but also to carry an ordinary standard gauge locomotive and loaded cars.

The general plan of the Company's new plant is shown in Figs. 1 and 2, and comprises about three acres of land located along the line of the N. Y., N. H. and H. R. R. The main building is 400 feet long by 80 feet wide, constructed entirely of brick, iron and glass. The general features of the construction are shown in the interior view taken from a photograph, Fig. 3.

The sides of the building are of glass, for a distance of 10 feet from the eaves, and below that are constructed of iron sliding doors, so arranged that they can be opened and closed quickly in order to allow the material to enter through the sides of the building, when necessary. In summer they can be removed entirely, thus very materially adding to the comfort of the employees.

The roof trusses are of iron, and each truss is designed to carry 10,000 pounds at any point along the line of the lower chord.

The whole plant is connected together, by standard gauge tracks, in such a way as to admit of the economical discharge of the raw material and the quick and economical loading of the finished product.

The standard gauge tracks extend the whole length of the plant, along each side, and at the front of the building, from which the finished product is discharged, are other spur tracks of standard gauge, one of which enters the building for a distance of 120 feet, so as to admit of iron being loaded inside of the building during wet weather. All the tracks are controlled at the front of the building by two jib cranes, so arranged as to work from a four drum Mondy hoisting engine, so that one man can operate both cranes at the same time. The loading facilities are of such a nature that 10 cars can be loaded in an ordinary day of 10 hours.

The building itself is served by three lines of narrow gauge tracks, one on each side and one through the center, the tracks being connected at each end of the building by transfer tables, the transfer tables also connecting these tracks with the tracks in the yard. The raw material is distributed on each side of the main building direct from the cars, and, after being sorted, is moved by means of the narrow gauge tracks into the north end of the shop—the end shown on the left of the illustration—where it is laid out from templates, trimmed at the shears and prepared for the punches.

The punches are all arranged with a drop motion, so that the punch can drop down on the work, and thus the operator is able to find the center mark and punch the hole exactly in the proper place.

From the punches the material goes to the riveting machines and from the riveters to the planers, drills, etc., and out at the South end of the shop; so that under no circumstances is there any occasion for work to pass except in one direction through the shop, the raw material coming out at one end, the finished product passing out at the other.

The interior of the building is lighted as above noted by the windows on the sides, and also in each side of the roof, the whole length of the building, is a skylight, 12 feet long, so that the building for its entire length is so well lighted that the finest kind of work can be done in any part of it.

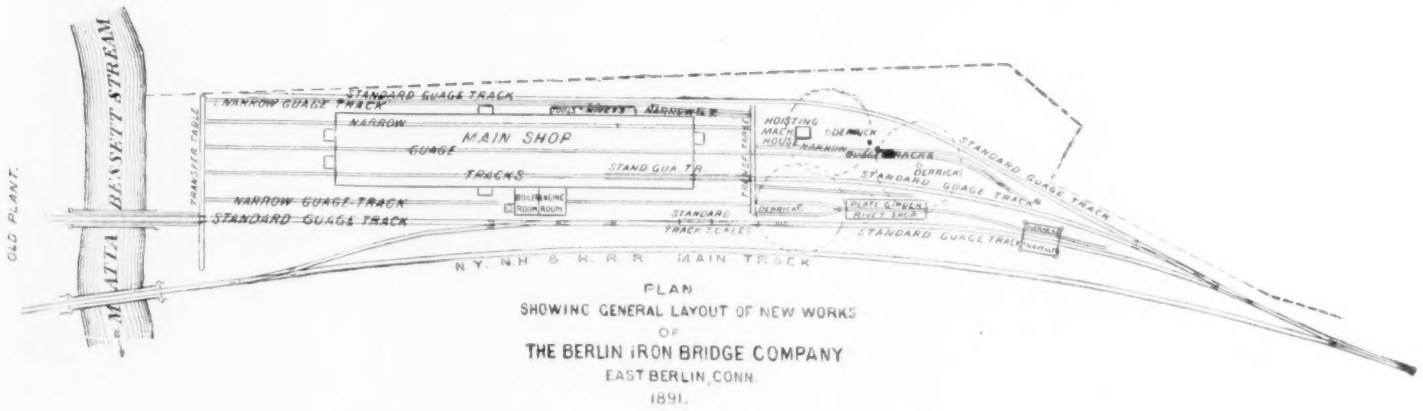
The building is heated by the well-known Sturtevant system of hot air, and all furnaces, both under the boilers and for rivet heating, are equipped with fuel-oil burners, so that crude petroleum is used entirely for fuel through the whole plant, although the boilers are so arranged that coal can be used if desired.

The plant is lighted by a Thomson-Houston dynamo, sustaining 250 incandescent lamps and 12 arc lamps on the same circuit—the arc lamps being used to illuminate the yard and to give general light for the shop, with two incandescent lamps at each machine.

The whole plant is constructed of iron with no wood work about it, so that there is absolutely no risk from fire, and thus the Company are not obliged to carry any insurance since there is nothing about the building which can in any way take fire and burn.

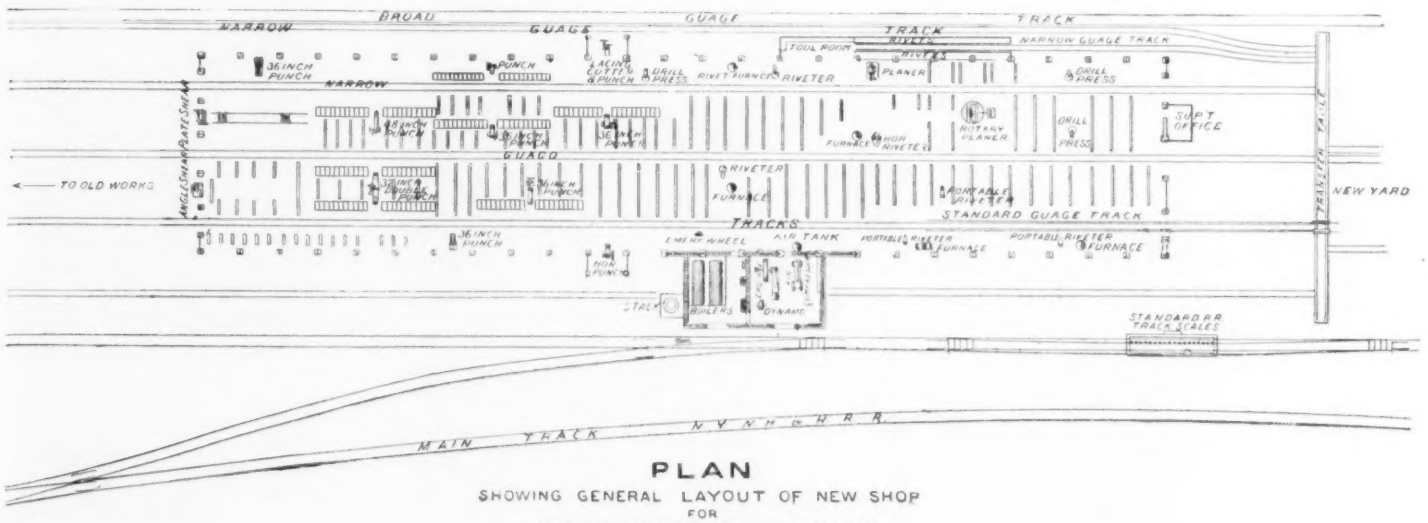
The construction being of iron the cost of maintenance consists only of painting, so that here we have a plant which seems to combine all the requisites of improved shop practice, as, certainly, with the improved facilities a shop of this description ought to handle all classes of structural work with the least possible outlay of labor.

In constructions of this kind certainly the cost of maintenance, repairs, insurance and the like classes of expense are seemingly reduced to an absolute minimum.



PLAN
SHOWING GENERAL LAYOUT OF NEW WORKS
OF
THE BERLIN IRON BRIDGE COMPANY
EAST BERLIN, CONN.
1891.

Fig. 1.



PLAN
SHOWING GENERAL LAYOUT OF NEW SHOP
FOR
THE BERLIN IRON BRIDGE COMPANY
EAST BERLIN, CONN.
1891

Fig. 2.

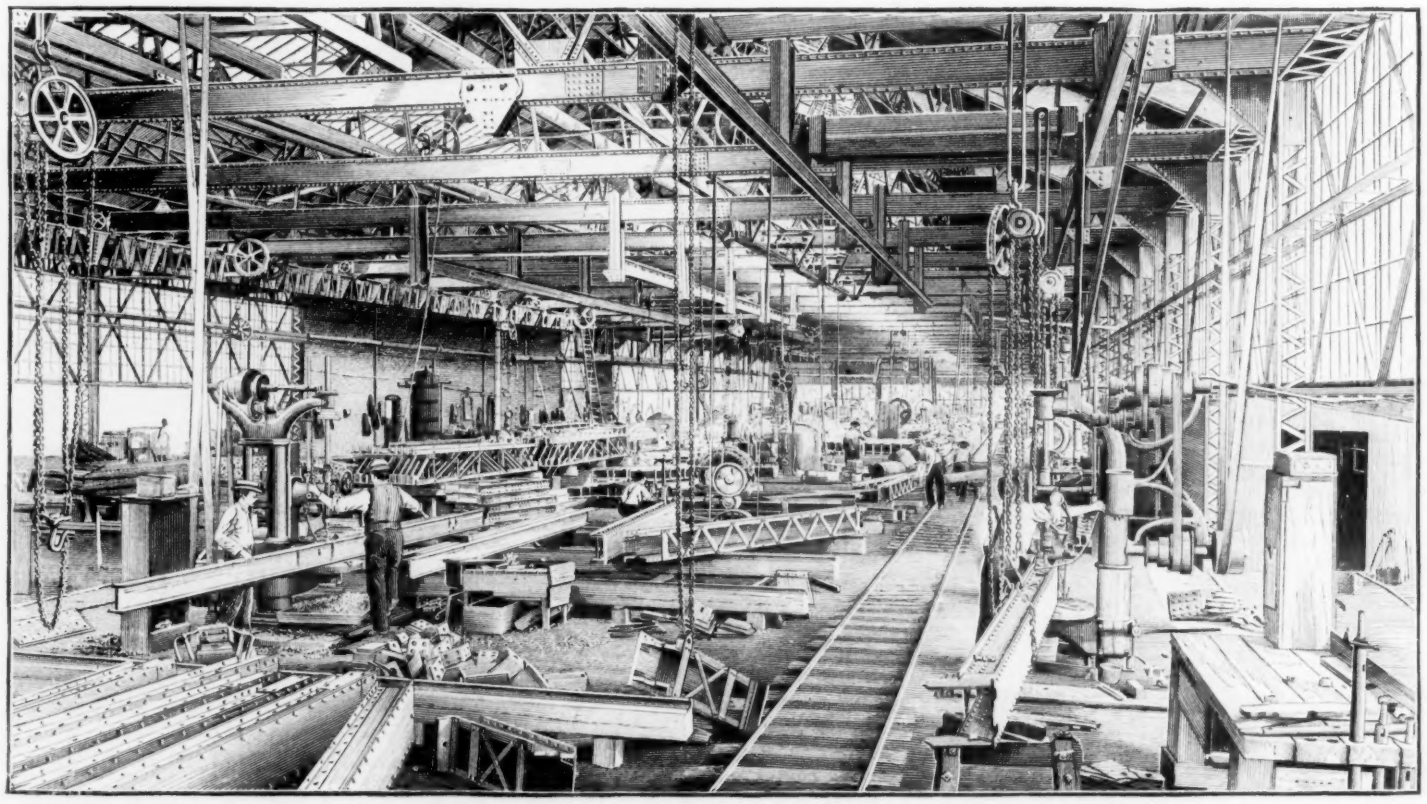


Fig. 3.

A Meter Registering Device.

The claims put forth for a device for printing on cards the reading of gas meters, direct from their dials and pointers that have appeared in recent advertisements in the JOURNAL are rather startling, and if all that the projectors of this invention claim is true, the necessity of sending a man to reread a meter, when a consumer makes a complaint, is certainly obviated. Again, it also *compels* the statement taker to go to each meter, for it is so constituted that each meter, in addition to a fac simile impression of the dials and pointer, prints the key number of the meter on the card. Therefore, to bring in a card corresponding to each meter, the inspector must go to each and every one of the meters on his route, and as each card bears the number of the meter the chance of having the reading of one meter entered in the place of another is virtually dispelled. It enables the cashier to show a complainant a complete picture of the hand and dials, all numbered. of his meter at the time the reading was taken, concerning the correctness of which there can be no doubt, thus settling a disputed bill at once, without the "chronic growler" being called upon to visit the gas office again to accept as proof another statement made by a second party sent to reread his meter a week or so after the original reading was taken.

In fact the register tends to relieve gas companies of many of the disagreeable incidents connected with their business, not to say anything about effecting a considerable reduction of expense. In fact, the register

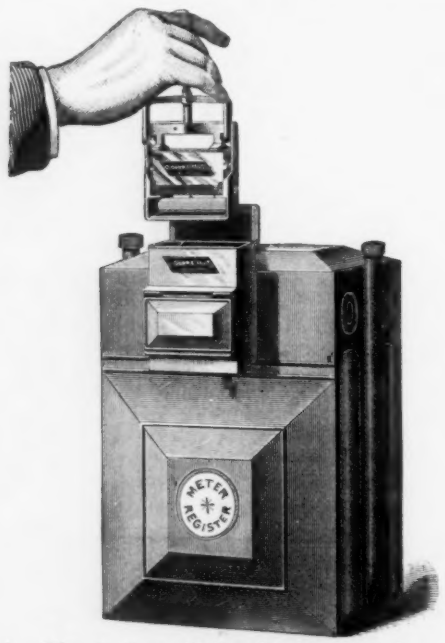


Fig. 1.—Meter with Meter Regulator Attached.

might fairly well claim to be a sort of pacificator, and as such tending to increase a gas company's sendout, because of its firmness in attesting to a meter reading in a manner that is unimpassioned, hence removing the impression from the mind of the complainant that the companies are hasty, arbitrary, unreliable or indifferent in their treatment of his wail

In the belief that a description of the device will be of interest to our readers, we give the following hints about its construction and operation :

Properly speaking, the meter register consists of two devices, one of which is called a "meter box" (shown attached to a meter in Fig. 1), the other being an "impression device," several forms of which have been perfected, and one of which is shown held in the hand and about to be pushed down into the meter box to take a reading. To take an impression with this form all that is necessary is to push the impression device into the meter box and withdraw it, when it will bring out a card, with dials and pointer and the number of the meter printed on it as shown in reduced size by Fig. 2. As neither light nor pen is required, the statement does not have to be taken by a man who, holding a pen in one hand and a book in the other, reads the meter by a dim light through a dusty glass plate. The thing is just as simple as stamping a piece of paper with a self inking hand stamp. The plate which presses the card against the dials is carried by universal bearings, and, therefore, adjusts itself to any lack of uniformity in the dials and pointers.

In Fig. 3 the interior of a meter box is shown. The dial and number of the meter, which are of rubber, all vulcanized in one piece, are glued to the back of the box, and to make it impossible for them to come off are clamped down by a suitable metal plate which covers all except the figures. The hands are also of rubber, and fastened into brass clips which are riveted to the spindles of a train of gears such as are commonly used in meters. The clips enclosing the rubber hands on every side have small lugs which are closed down on top of the rubber hands, so that they cannot come off. The clips rest flat on the back of the meter box, which is made of brass about $\frac{1}{16}$ inch thick, and receives all the pressure of the impression device. As will be seen, the meter box is a very simple affair. In attaching it to a meter already in use all that is necessary is to take out the old train or clockwork, and in place of

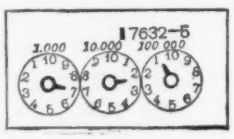


Fig. 2.—Meter Register Card.

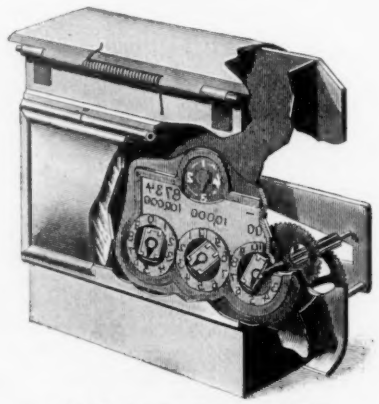


Fig. 3.—Interior View of Meter Box.

the dial solder the meter-box into the meter. A tin casing not shown in the cut is provided to cover the clock work, and the worm spindle can be packed if desired. There is the usual glass plate and cover over the dials and pointer, with a cover at the top of the meter box which is closed with a spring and lined with thick cloth to exclude the dust.

The impression device (shown in Fig. 4) is of convenient size to be carried in the pocket, and resembles the ordinary hand stamp. In its lower end is a rolling ink pad, which is covered by a metal sheath. When the impression device is inserted in the meter box the cover of

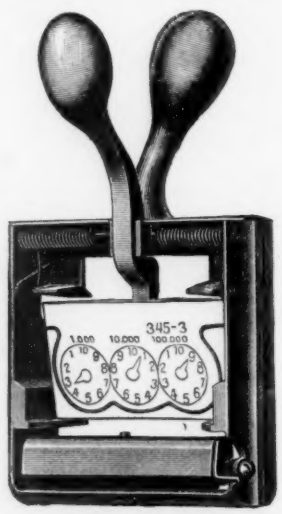


Fig. 4.—Impression.

the ink rolls over the dials and pointers and inks them. Just above the ink roll is a flexible platen, adapted to hold a block of several hundred cards. When the impression device reaches the bottom of the box, by squeezing the handles together the paper is forced squarely against the type, and a facsimile impression is taken. The form of impression shown in Fig. 2 is the same, except that there is only one handle, and it is continued downward pressure, after the impression device reaches the bottom of the box, that causes the paper to be forced against the type. As each printed card is taken out a fresh one is left exposed and ready to be printed upon. The cards are gummed at one end for past-

ing in the route book. Each is pasted so as to overlap the previous one, and as only one end is fastened, the free end can be raised to show those of previous months. A route book containing the cards of 30 consumers for one entire year would only be 1½ inches thick and 13 by 10 inches in size.

When consumers of gas think they have been overcharged they usually direct their condemnation against the gas meter; but in doing so they make a mistake, for if the meters were guilty of many of the sins with which they are charged it would only be necessary to examine their mechanisms to discover the principles of perpetual motion. No; we fear the statement taker is the one that they should blame. True, he has but to examine each meter dial, and follow that up by properly entering the figures of his reading in their proper places; but as men are human, he often falls from grace because temptation to shirk is constantly before him, and he does shirk once in a while. In fact, a gentleman prominently connected with the gas business recently made the statement that he was convinced that 90 per cent. of all complaints are attributable to improper readings of meters. Can we, then, hail the meter register as an aid to cut that percentage down to a less imposing figure?

The Storage of Coal in Gas Works.

[A paper read by Mr. D. Irving before the Southwest of England District Gas Manager's Association.]

The subject of storing coal in gas works has for some time been engaging the attention of gas manufacturers, and is one of such importance to every member that I trust no apology is needed for bringing it before this Association.

It is doubtless the sincere aim of all gas engineers and managers to produce and deliver to the consumer good and cheap gas at the least possible cost; but it must be remembered that one of the first duties of the gas manufacturer is to provide a supply that shall be, above all things, reliable. In these days gas not only cooks our food, warms and illuminates our homes, but supplies the motive power and light for many large and various industries. It is, then, of the utmost importance to foster and delvelop our business in these new and desirable directions. We must be prepared to almost guarantee an absolutely regular and uninterrupted supply; and if this is to be done under all circumstances, it will be necessary to maintain a much larger stock of coal at the works than has hitherto been the case in many places.

There has never been a time in the history of gas manufacture, when a more constant, watchful, and wise attention was necessary on the part of those responsible for the successful counduct of the works. Especially is this true in regard to the proper storing of the raw material, and maintaining a reserve that shall place us in such a position that we shall be prepared for almost any emergency, at the colliery, in transit, or in our own works. It is generally urged against the proposal to provide adequate coal-store accommodation that the necessary sheds are expensive, the additional labor entailed costly, and the deterioration of the coal a serious matter. Whatever differences of opinion we may have upon these three several points, there is no question but that some stock of coal is necessary in every works. Our circumstances and surroundings are so various that no hard and fast rule could be laid down that could be applicable to every works; each manager or engineer must judge, and is best able to judge, of his own requirements. The general agreement, as to the necessity of ample storage accommodation, of all the various members of the profession who have recently written or spoken upon this subject is striking. Mr. Newbigging some time ago stated that he had been in the habit of recommending, as a general rule, the laying in of a six weeks' stock of coal, reckoned on the basis of the mid-winter rate of consumption; and this rule seems to find general favor. Six weeks' storage, upon Mr. Newbigging's basis, equals about 20 per cent. of the coal received during the whole year, and would be equivalent to between three and four months' summer consumption. The question as to what is an ample and safe stock of coal will entirely depend upon the position and circumstances of the works in question. A works situated near or between two or more coal fields, and drawing its supplies from each, and having more than one railway company upon which to depend for its supplies, would be able to work, and work safely, with a much less reserve than works situated some distance from the coal fields, or works depending entirely upon sea carried coal. Under the first named circumstances, a reserve of about 10 per cent. of the annual amount carbonized might be considered a fair reserve store.

There is, it must be admitted, with many managers burdened with excessive capital, or having heavy working expenses which they are anxious to reduce, a great and natural reluctance to provide the necessary and desired covered accommodation, or yet even to store their coal in the open, because of the common experience that coal so stored rapidly deteriorates. They struggle on from hand to mouth, choosing rather to bear the worry and strain, in order that they may produce gas which shall be at once cheap to the consumer, and remunerative to their employers.

The respected President of the Southern District Association of Gas Engineers, in his Presidential Address this year, in stating his experience of coal stored both under cover and in the open, gives his preference, in the matter of disposition to heat, to that stored under cover. He remarked, however, that his coal stores might possess some inducement for the coal to heat, from their relative position to the retort house, where the temperature is much higher than in the open.

The causes of heating are due to the chemical changes of certain substances--such as iron pyrites, and other sulphur combinations, with the oxygen of the atmosphere in the presence of moisture. Professor Vivian B. Lewes, in a paper on the spontaneous ignition of coal in ships and stores, read before the Institution of Naval Architects, gives the results of some comprehensive inquiries, and explains the cause of fires in coal cargoes, clearly demonstrating that the heating of the coal is due to its tendency to absorb oxygen in the presence of moisture. He shows that a coal in bulk, which contains much freshly-broken small, has a considerable power of taking up moisture, and is far more likely to heat and fire than a drier coal, even if the drier coal should contain a larger quantity of pyrites. The learned Professor proposes to distribute cylinders of compressed carbonic acid, secured by a fusible plug, throughout the bulk of the coal. The suggestion was not very favorably received, but was, to use the Professor's own words, "dropped upon." Experience has proved that to store coal for any length of time, it is absolutely necessary that it should be as dry as possible when stacked. How is it possible to accomplish this in the open? It has been found that two or three wet days during the time that the coal was being stacked was sufficient to cause heating, and to endanger the whole stack of 6,000 tons of Bristol district coal. No other part of the stack heated, excepting the particular portion exposed during the rain in question.

Another reason for storing coal under cover is that the water absorbed when in the open has to be paid for at the same rate as the coal for carbonizing. Exposed coal has been known to take up as much as 10 per cent. of water, in addition to its natural, or ordinary moisture. Coal containing (say) 5 per cent. additional water will, of course, increase the cost of carbonizing 5 per cent., which works out at 1.8d. per ton where the carbonizing costs 3s. per ton. The smaller the coal, the greater will be its power of retaining moisture. Bristol district coal, stored for three months in the open, has been found to depreciate over 10 per cent. The advantages gained by having and using dry coal, together with the increased work done in handling coal under cover, not to speak of the duty of protecting our workmen, will fully repay the cost of covered sheds. What is required in storing coal, either in the open or under cover, is that the coal should be fairly dry when stacked, and that it should be well ventilated. Wet coal will fire whether stacked in the open or under cover, if there be sufficient bulk. It has been found that a coal with an exceptional tendency to heating will not fire, even if wet, if placed in a stack of not more than 6 feet deep. Coal in stores should be well ventilated with shafts placed every 10 feet, so as to prevent or check the first tendency towards heating. Inadequate ventilation is worse than no ventilation, because, if there is any tendency whatever to heating, it only serves to supply oxygen, and help the destruction of the coal. It is desirable to have an intelligent arrangement of coal stores, so that a regular system of working the oldest coal first can be carried out. If coal is being stored which is likely to heat, a number of 1-inch pipes should be inserted throughout the stack, into which a thermometer could be lowered and the temperature taken daily. Wherever any indication of heating was found, the coal from that particular part should be used at once. Another system, to which attention was called by Professor Elgar, and recommended for consideration by the *Journal of Gas Lighting*, and which is understood to be compulsory in vessels carrying coal under the American flag, is that of having a number of steam pipes—about 2 inches in diameter, and perforated with a number of ¼-inch holes—placed vertically throughout the coal. These pipes would also be available for taking the temperature as previously suggested. In case of heating, a flexible steam-pipe connection is attached at the end of the pipe nearest the heated coal, and steam blown into the suspected region. This system may be of some service if a considerable temperature has been attained in the coal, or if the steam could by any means be again conducted out of, or through the coal, then the large capacity of steam for heat might be utilized: but if the steam is to condense in the coal, would not the large amount of heat in-

troduced be a source of danger? If it is a question of reducing or checking the action in the first stages of heating (and this is what should be aimed at), would not the danger to be apprehended from the large amount of latent heat introduced in the steam constitute an overwhelming argument against its use? It is well understood, of course, that there is no such thing as spontaneous combustion in connection with coal stored either in ships or stores. The heating in all cases extends over some time. The arrangement with iron pipes into which the thermometer is lowered enables the condition of the entire stock to be kept under daily observation. It will rarely be found, even with the most active coal, that the temperature will exceed a rise of over 3° C. in the 24 hours—that is, in the first stage.

It has been suggested, and in some few works carried out, that coal should be received at the gas works in equal monthly deliveries. This course has been very eloquently advocated by Mr. C. E. Jones, the able and accomplished Engineer of the Chesterfield Gas and Water Works, who says: "I am convinced that it is to the best interests of the gas industry to prevent, or reduce to a minimum, colliery strikes; and one undoubted means of so doing is the equalization of the output of coal." Take a works carbonizing 50,000 tons per annum. This works would require, under the equal monthly delivery arrangement, about 4,167 tons of coal per month; and from March to October 66 per cent. of the year's coal would be received but only 50 per cent. carbonized. During the remaining four months—from November to February—34 per cent. would be delivered; but 50 per cent. of the whole year's coal would be carbonized. Under the general rule given by Mr. Newbigging of providing accommodation of six weeks' maximum carbonization, there would be, at the end of February, in the works cited a reserve in the stores of 4 per cent., or about 2,000 tons, to which must be added any further margin of safety that local circumstances may require.

The cost of the stores as here set forth, including the apparatus for unloading and handling the coal, could be erected for about 40s. per ton, which, reckoned at 5 per cent. interest, and adding 2 per cent. for depreciation, gives an annual cost, which works out at 6.72d. per ton of coal carbonized. Mr. T. O. Paterson, of Birkenhead, states that he has taken deliveries during the summer months for September consumption, and that in one case he had obtained a reduction of 6d. per ton for coal so taken; but he thought the reduction was not sufficient to cover the loss entailed by storing coal for so long a period. If gas committees and companies could make any arrangements whereby the coal owners could equalize the working of their pits and the time of their workmen, there ought to be no difficulty in obtaining a reduction of 6d. per ton on coal taken upon any such terms. It is not contended for one moment that there would be no deterioriation with coal stacked in covered stores; but it is cotnended that coal mined and stored under the conditions named would not deteriorate more than coal exposed for the shorter periods during the winter months. It has been aptly stated that "coal is better mined, better transported, and delivered in better condition in summer than in winter." Can it be maintained that coal delivered and housed in June will turn out worse at Christmas than coal that has been raised wet, and delivered in the retort house in sloppy, wintry weather? And since, all things being equal, it is easier to make gas in the summer than in the winter, would it not equalize matters if the coal which has been longest in store, were used in spring or summer, leaving the fresher dry-stored material for the winter's make? During the past two months, the rainfall in the Bristol district has equalled the extraordinary amount of 11.47 inches—equal to 4.77 cwt. per square yard, or 1,155 tons per acre.

It is remarkable how little care and attention are given to the coal in some works. We are charged at times with being very unscientific in our methods. Picture to yourselves the condition of coal in works—and there are some—where every pound of coal used has been more or less exposed to the recent heavy rains, and where the small coal could scarcely be distinguished from road mud. Under such circumstances, surely little argument will be required to prove the advantage of well arranged and ample coal stores. After every provision has been made for suitably storing coal, and every preparation made for handling the same at a minimum cost, the greatest care and firmness will be required to prevent the coal contractor from using for his own convenience that which has been provided for yours. Alderman Miles has publicly stated that at Bolton they were well provided in the matter of coal stores; and notwithstanding all the provisons they had made, they were reduced, in the winter, to something like 24 hours' supply; and this is not a solitary case. The contract specification should be clear and distinct; and, as far as possible nothing should be allowed to interfere with the contract arrangement of deliveries.

In conclusion, the question is inevitably one to a considerable extent of profit and loss. Yet there are other important considerations to be kept in view—the security of supply to our consumers; the duty of providing protection for our workmen; and perhaps the collier, who is so often struggling for a larger share of the profits obtained from the coal he wins at the risk of his life, is entitled to our consideration.

Some Details of the Care and Management of an Arc Lighting System as Practiced in the "Municipal," of St. Louis, Mo.

[A paper read by Mr. J. L. Ayer before the National Electric Light Association.]

As central station men it seems to me that we should demand of each other as much knowledge of our practice and experience as is practicable to give. In fact, if this Association is to be useful, our meetings should be largely "experience meetings," and the practical experience of those engaged in the development of the lighting and kindred industries, if given liberally at each meeting, would be followed closely by those interested in the production of electrical apparatus and supplies, and would do much to advance the business and to improve appliances. Believing that we are here, as central station managers, for mutual improvement and for the free interchange of ideas and experience, I have presumed to present you with a limited, though doubtless dry, outline of the practice which obtains in the central station under the writer's charge.

The station, as designed, has a working capacity of 6,000 arc lights, and is now operating daily 3,500, and about 200 constant current motors. Two thousand of these lights are distributed over an area of 60 square miles, suspended between and from poles 50 and 65 feet in length, at a height of from 35 to 50 feet above the roadway, an average distance apart of about 900 feet, and used for street lighting. The motors and about 1,500 lamps are operated for the usual varied service of private consumers; 69 circuits supply the lamps and motors, containing about 1,200 miles of wire and supported on 12,000 poles.

For generating the current, we have six 600 horse power Corliss engines, which drive 500 feet of shafting, from which are driven sixty-five 60 light, and twelve 80-light, 2,000 candle power arc dynamos. The arrangement of the dynamos is such that we have ample room for the care of 85 machines on a floor space of about 100 × 45 feet, and are able to operate a large number of dynamos with a very limited amount of help. Four boys and one young man of very limited experience care for all the machines during the night, in an entirely satisfactory manner; while a suitable man, with three assistants, give the necessary care to the dynamos during the day.

Thirty-one trimmers, with horses and carts, travel about 500 miles a day to renew the carbons in the street lamps. The average number of lamps to each of these trimmers is 68. Sixteen trimmers care for the 1,500 commercial lamps. Five inspectors, or trouble-men, with carts and horses, care for the lines night and day, answer fire alarms, locate faults and correct minor troubles on the lines. Two day and two night inspectors care for the commercial arc and 2,500 incandescent lamps. A stable of 20 horses, in addition to the 40 horses owned by the trimmers and inspectors, is required. The maintenance of 60 vehicles justifies a blacksmith and wagon shop, which, with the stable, require the service of eight men. Two men care for the shafting, and three engineers and four oilers for the engine room. In the boiler house, where there are nineteen 300-horse-power boilers, there are 2 pump men and 2 assistants, 12 stokers, 1 boiler cleaner and 6 coal shovelers. These, together with an average force of 35 line and ground men, foremen, chief trimmer, chief inspector, superintendent of lines, storekeeper, repair shop employees, carpenters, clerks, etc., constitute a force of about 170 men. A very large per cent. of these men are called upon to perform duties which are simple, yet, because of their extreme newness, are not thoroughly comprehended by them. To get the best results, each man requires clearly written rules, as few of them as possible, and their rigid enforcement. In all practice this is the wise way to put it; but it is absolutely necessary that it be so with a large force, where many of the men do their work independently and free from the constant supervision of a foreman.

In the room used as an office at the station by the inspectors and foremen are city maps, mounted on boards, where the locations of the lamps are indicated by tacks and the circuits by strings. For the central part of the city, where there are many circuits on the same line of poles, each circuit is shown on a separate map of that section. A number of printed slips, which represent a pole with cross arms, indicate the location of the wires on the poles on the different streets traversed by the different circuits. Any change of circuits is noted on a separate blank when the work is ordered, and when completed the maps are corrected

correspond. It takes but a few days for a man to become quite familiar with the circuits, by keeping them so conspicuously placed. In large stations this method of indicating circuits is almost indispensable, and will prove of great value if used in smaller ones.

For testing purposes, we have a portable tachometer for indicating speeds, two Thomson indicators for the engines, a recording steam gauge, two standard ammeters and a voltmeter reading to 5,000 volts for the dynamo room; on each circuit a spring socket for attaching ammeters, and a current indicator for indicating the direction the current is flowing through the circuit; near the lightning arresters on the upper floor, a switchboard specially arranged for testing only; a wheatstone bridge, magneto bells, etc. The engines are indicated once each day.

Evaporation boiler tests are made every month to see that the quality of coal is maintained at the standard. All the circuits are tested four times each day. All live circuits during the day are tested for grounds, and all others for apparent open circuits as well. In addition to this, all circuits are tested while alive by taking volt and ammeter readings simultaneously. The number of miles of wire and number of lamps being known, any material increase in the energy consumed gives evidence of a fault not always easily discovered by other methods. In testing for grounds on circuits not alive, a strong magneto bell is used. For all other testing a battery current of from 30 to 50 volts is used, and the circuit is required to pass at least one ampere to operate an ordinary call bell. When this bell is placed in a series with a circuit which has more resistance than will pass this current at the pressure, the circuit is at once inspected and the fault located. In locating the trouble, one side of the bell circuit is connected to the line and the other to earth. The inspector or trouble-man carries a similar bell with him, which he connects in series with the earth and line at various points, until the fault is located. The value of circuit testing with low voltage is keenly appreciated by those who have practiced it. When the circuits are alive, ammeter readings are recorded every two hours, and all readings are from the same instruments. These instruments are arranged so as to be read singly or in series, and one is used to check on the other. The value of first-class instruments in plants of any size cannot be over-estimated, and should be in daily use in all stations, rather than the makeshifts generally supplied.

The stopping and starting of engines and boilers, pumps, dynamos, circuits, etc., are all recorded on reports made by those in charge of the different departments. Each inspector, trimmer, line foreman, store keeper, and all heads of departments, make daily reports of work done and time and material used by them. Each trimmer is charged with a certain number of demerits for each fault on his route, such as defective or dirty lamps, broken or dirty globes, carbons used in excess of the required number, etc., and each month prizes are awarded to those having the best records.

The advantage of using vehicles for trimmers for all street lighting work is being recognized. Provide a man with proper appliances and your service will improve. He cannot carry all that he should and walk long distances, nor will he take the same care when he is worn out with tramping that he otherwise would. We find it desirable for the trimmer to own and care for his own horse, while the company provides a suitable vehicle and harness, which he turns into the stable once a week for inspection, cleaning and repairs, when needed.

We select from our line men those whom we class as inspectors or trouble-men, who are equipped with a light-running cart, with a suitable place for the storage of all tools necessary to use in an emergency. In addition to the special duty required of them during storms or at fires, these men correct all minor troubles reported to the office from various sources. During the first year's operations the average time lost, due to open circuits at night—that is, the average time lost from the time the circuit was opened until it was closed and the lights restored—was an hour and five minutes, notwithstanding that all circuits are more than 10 miles in length. When these troubles occur, it is almost always during a storm, but the conveyances with which they are provided and their thorough knowledge of the circuits enable them to become very expert in locating and correcting troubles. During the past year nearly 15 per cent. of all the calls answered by our trouble-men were to correct troubles on the lines of other companies. Because we have wires all over the city, the police, and the public generally, think that all the wires belong to us, and when they discover any trouble with them, are very apt to report the same by telephone to our station. During the entire 24 hours there is always one man on duty, ready to answer just such calls and correct the troubles.

All arc lamps before leaving the station are placed in a test rack, where they are supplied with a current maintained absolutely constant. Voltmeter readings are noted soon after the lamps have been lighted, when the carbons are about half consumed, and also when they are burned quite short. During the early part of the burning the lamp is adjusted so that the readings, taken at three different points, give an average reading of 46 volts. In case of double lamps, this work is carried out on both rods.

This extreme care in regard to adjustment we regard as absolutely necessary. If a lamp is permitted to consume its carbons, any fault which would not be discovered with a brief test is quite likely to develop. To determine the length of arc by the current and voltage is more likely to result in uniform lamps than where tested by the eye. With 10 lamps, adjusted to burn at an average of 46 volts, with 9.5 amperes, the average number of watts per lamp was 436. Without changing the adjustment of the lamps the current was increased to 9.8 amperes, and there was an average consumption of 524 watts per lamp—an increase of 20 per cent. of energy; and by increasing the current to 10 amperes the average number of watts per lamp was 550, the average voltage 58, the increase above normal being 33 per cent. That means 33 per cent. more coal, 33 per cent. more work at your dynamo, 33 per cent. less capacity in your dynamo, and probably 33 per cent. less life in your armature. One is apt to think that the difference between 8.5 and 10 amperes, when supplied to the lamp, is only a difference of 5 or 10 per cent., which is not very serious. This would be true if the lamp were adjusted each time for the ampere current it was to be operated with.

To those who have not made this experiment, perhaps a portion of the mystery as to where the coal goes will be cleared up. By using the ammeter and voltmeter for adjusting the lamps, and then seeing that the circuits are provided with the same ampere current indicated by the same ammeter, one will be apt to bring about like conditions in all lamps; at least, they are more likely to be uniform than if independent ammeters were used on each circuit.

By reference to this statement relative to the amount of energy consumed by change of current, it will be easy to see how expensive one or two low lamps would be on a circuit, where the operator, to correct the trouble, supplies them with current enough to make them bright. Of course it is understood that better service as well is obtained by operating the circuits with no more current than that for which the lamps are adjusted.

In this connection I believe it is proper to again call attention to the well-worn subject of connections. A great deal of time and trouble is spent in soldering joints, and when the lines are led to the lamp they are apt to be poked into the binding posts, held with set screws indifferently tightened, and between these binding posts and the lamp connections proper there are perhaps three or four, if not more, indifferent contacts, all of which look very well in the factory, but are very bad after a few months' service. Hanger-boards should be used which have the line wire soldered to connections which cannot get loose. In our practice we accomplish this by using about 18 inches of flexible insulated cable, which is soldered to the hanger-board binding posts at the station (cut-out boxes are treated in the same manner), leaving the lineman nothing but an ordinary line joint to make, which can be easily done outside.

Where lamps are suspended from the hanger-boards by the hooks which conduct the current, we always insist on some character of second connection being made to the lamp besides this. A simple way to do this is to take some small wire and tie the hook to the loop, in much the same manner as you would with a piece of twine. We have no screw connections anywhere in our circuits, and with a little ingenuity and care they can be avoided always in arc lighting circuits. By the use of a special socket in each circuit for connecting an ammeter, we are able to take the readings with volt and ammeter, and get a correct indication of the actual consumption of energy on a circuit while in operation. With the data relative to the number of lamps in service and the number of miles and size of wire, we are able to discover any excessive consumption of energy, and prevent the development of a series of little faults, which in a short time grow to be very serious ones if permitted to continue.

Usually these readings are taken on each circuit three times a week, and during the time these observations are made indicator cards are taken from the engines. From these two sources we get the actual consumption of electrical energy per circuit and per engine. We also get the indicated horse power.

From a set of 11 observations, taken from July 30th to August 28th, at various hours during the night run, the station shows an efficiency, between indicated horse power and electrical horse power at dynamo terminals, of 74.9 per cent., ranging from 70.3 per cent., the lowest, to 77.5 per cent., the highest efficiency shown. The circuit readings indi-

cate an average consumption of energy per lamp of about 0.6 of an electrical horse power. The average indicated horse power is about 0.8 per lamp.

A good condition of the circuit is maintained constantly, because any neglect in any department is quickly shown by the data obtained from our records. Some months ago, when press of business caused the measurement of circuits to be neglected for a few weeks, the writer discovered an increase of over 10 per cent. in the consumption of fuel, when there should have been a slight decrease. An investigation showed that an accident to an ammeter had caused a false reading, which increased the cost of fuel alone abou $16 a day. The difference in the appearance of the lamps was not such as to call forth special comments than by those interested, yet, when the fault was discovered, it was remembered that some seemed to have been burning high for a week or two.

On suburban circuits on long loops, it is our practice to place cut-out boxes on the pole where the line branches. This saves a great deal of time in locating troubles; but let me add that unless a thoroughly watertight and substantial cut out is used, it will prove more of an annoyance than an advantage. A log of each circuit and dynamo, as well as of engines and boilers, is a very satisfactory and desirable part of the records, and will frequently assist materially in locating troubles and saving expense.

Throughout the country it is almost the universal practice to wire for arc lights without cost to the customer. There is no valid reason for this custom, and for more than a year it has been our custom to charge for cost of labor, with the result of reducing expenses more than $600 per month. In every case where lamps are discontinued in the spring, we require a contract for fall and winter service, else the wires are removed when the lamp is taken down. We invariably cut down the line between the house and pole where the service is discontinued for the season, though it is to be renewed later. To induce annual contracts, a rebate of 5 per cent. is given at the expiration of the year, and is found to work to advantage.

There are very many details of construction, as well as of office work, which could be referred to if it were not that this paper is now too long; but I will be glad to furnish a copy of "General Instructions to Employees," used in the government of this plant, which refer to and bring out some points of management which are not mentioned here, to those who care for them.

Petroleum in Marine Furnaces.

The employment of petroleum for generating steam in the boilers of marine engines has been revived by the recent experiments with it on the English steamship Erros and the Italian vessels Castelfedando and Ancona. But the most successful use of petroleum as fuel has been on the English torpedo boat Sunderland, which has a displacement of 86 tons and a length of 137 feet. The boiler is of the ordinary locomotive type, with web bottom, the furnace front being arranged to receive the oil burners, which are 31 in number. The liquid fuel used is pumped from the double bottom (the tanks which hold the oil), and discharged into a small cylindrical tank, where it is subjected to an air pressure of 35 pounds per square inch, and whence it flows direct to the burners.

In the fire room is an air compressor which discharges into cylindrical air tanks near the vessel's side, forming a group of four. The working pressure of air in these tanks is 40 pounds per square inch, and it is conveyed here for the purpose of disintegrating the oil as it leaves the burners. Each jet of oil gives a clear bright flame, about 6½ feet long and 9 inches in diameter, if burning alone. When the jets are combined in the furnace there is a bright mass of fire about 2 feet from the furnace mouth to the tube plate. This flame entirely fills this portion of the furnace, and gives forth neither smoke, smell, nor sparks, so that neither soot nor dust is deposited in the tubes, and no cleaning is required. Special precautions are taken to avoid the bad effects of high temperature and rapid changes of temperature, and it is stated that these are so efficient that, though the boiler has been repeatedly forced very hard, there has not been a sign of leakage.

The Italian Government is continuing its experiments with oil fuel on vessels of war, and, while no definite information is afforded as to technical details, it would seem that satisfactory results have been obtained. The Peruvian Government has directed that the gunboat Santa Rosa be altered for burning oil in its furnaces. The British Admiralty are considering the advisability of burning oil fuel, but have not as yet decided what kind to use. The Navy Department will have some definite results on the use of oil fuel within the next few months, as it is the intention to have exhaustive experiments made with it by the Board of Engineer Experts at the New York Navy Yard.

The special advantages claimed for liquid fuel are: It has greater efficiency than coal, weight for weight; the manner of stowing it in the double or cellular bottom gives increased stability to the vessel and increase of available space for other purposes, now occupied for the stowing of coal; it will require a less number of fire room force than with coal fuel, and there is no ashes nor refuse from oil fuel. In maneuvering under steam, it may often be desirable to stop suddenly while at full speed and not to use the engines for some time. With coal fires this would be difficult, as they would have to be banked, and while lying dormant would become dirty; but with liquid fuel as many burners as necessary may be shut off when the engines are stopped, only enough being kept in operation to prevent the steam pressure from falling. When full power would be required it could be had at once, with furnaces and everything clean and in good shape.

Labor-Saving Machinery.

The effect of machinery upon labor was ably discussed some months since by Professor De Volson Wood in the columns of the *Mechanical News*. His presentation of the case was both instructive and complete, and I, says Mr. Frank E. Williams, in the same journal, am very far from dissenting from any of the conclusions reached by him. Nevertheless, I venture to offer my individual view of the subject, possibly with a more decided leaning toward the wage earner's attitude with reference to it, and having in mind especially the strong censures I have sometimes heard bestowed on the humbler portion of that class for the wrong-headedness which they occasionally display in this regard. There was a time when labor-saving inventions, of whatever kind, were certain to encounter the violent hostility of working men. With very few exceptions the whole community of wage earners were disposed to resist, peaceably if they could, forcibly if they must, the introduction of any machine which would enable one man to do the work which had previously given several men employment. Increased enlightenment and popular education have produced a marked change in this respect. The great majority of workingmen are now aware that the useful inventions of this century have bettered the condition of the whole people, themselves included; and that the immediate temporary loss occasioned by a labor-saving device to the men whose industry it affects is more than made up in the long run, to them as well as to everyone else, by the cheapening of the article produced. In course of time, as a result of this process, the cost of living is reduced; or, more accurately speaking, the scale of living, at a given outlay, is raised.

There can be no question that working men, both of the agricultural and mechanical classes, get more conveniences and luxuries, better houses, furniture, utensils, clothing, books, papers and amusements for the same amount of their own labor now than they did 50 years ago. This, which is the correct philosophical view of the matter, is a much more prevalent view than it was 25 to 50 years ago. So general, indeed, has it become, that when in these days a protest is made by some body of working men against the adoption of a machine the first effect of which will be to take the bread out of their mouths, there is a great wonderment at such a revival of ignorance and barbarism. For it does even now occasionally happen that working men are unable to silence the appeals of hunger by reflections upon philosophical verities, and are charged with incredible folly and stupidity because they do not like to wait, and keep their families waiting, until a term of years has passed, and the law of compensation has had time to set them right again.

Mankind will not dispense with labor-saving machines. It will keep all it has and invent as many more as it can. It will not submit to have the wheels of progress blocked or turned back, whatever may happen to individuals. It would be idle to ignore this fact, and still more to offer objections to it; but I, for one, am not disposed to join in unsparing condemnation of the men who cry out when a sudden change occurs which leaves them in enforced idleness and subjects them to the pinch of poverty. The innovation which brings misfortune upon them may be of immense and ultimately of universal advantage to mankind. But the benefits to flow from it are indirect and remote, so far as they are personally concerned; in any given instance they are small as compared with the hardship of a total loss of employment; and whatever we may say, it is inevitable that men will realize more keenly the privation which they actually feel than the good which they are taught to expect. If some preparation were to be discovered by which, at trifling cost, shoe leather could be rendered so durable that from this time forward no shoes would need to be either replaced or repaired, there is no denying that every civilized nation would be instantly made richer by many millions of dollars. Speaking generally, it would be just cause for universal rejoicing. But a poor shoemaker, knowing that he should never make or cobble another pair of shoes, and unable to turn to any other

occupation by which to maintain his family, could hardly be expected to join his voice to the chorus of congratulation. Step forward five or ten years, and doubtless the shoemaker and his children, if they have managed to survive the immediate disaster, will be found sharing the general increase of prosperity. But a prospect of that kind, be it never so clearly assured, can do nothing to alleviate the distress of the time being. A large allowance, therefore, must be made for what we term the unreasoning hostility of workingmen to labor-saving machines. There is less of that hostility—the men are, in fact, better reasoners and more patient philosophers than could rightfully be expected, human nature being what it is. And when those rare instances occur, which are constantly becoming rarer, of a blind revolt against the methods by which civilization must re-adjust its industries, they are to be judged not with harshness, but rather with charity and commiseration.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. K. M. MITCHELL, Superintendent of the St. Joseph (Mo.) Gas and Manufacturing Company, writing under date of the 26th of September, says: "I enclose clipping from the *Daily News*, of this city. It is a very good expression of the relative values of coal gas, which was formerly used in the clock tower written of, and the Fahnehjelm gas that is now in use in the same tower. You will notice that the pipes were large enough for our gas, but not large enough for non carbureted water or fuel gas. It requires the use of 2½ times as much water gas to give the same light or heat as that evolved from one volume of 16-candle coal gas." The clipping referred to by Mr. Mitchell is appended:

"Editor of the *Daily News:* In an article in the *Daily News*, entitled 'Red Tape,' the impression was given that the Light and Fuel Company was prevented from furnishing sufficient light in the clock tower by me. This is not true. When the St. Joseph Light and Fuel Company was awarded the contract to furnish the light for the United States Custom House during the fiscal year, beginning July 1st, 1891, I permitted it to take out the 8 gas burners and to change the pipes in the clock tower and put in 24 of its own gas burners and its own pipes. In doing this its men meddled with the clock and stopped it. I had to call in Mr. Lysaght to repair it. Since then I have refused to permit them to touch the clock or pipes, as I think 24 of their burners ought to give as much light as 8 of the old Gas Company's burners. As to regulating the clock, that matter is left by the contractor with Mr. Lysaght, and I do not propose that any gas employee shall be permitted to regulate or have charge of the clock. The St. Joseph Light and Fuel Company wanted to put a larger pipe into the clock tower, claiming that the pipe now in is not large enough to carry sufficient gas up to properly light the clock. This could only be done by authority from the Secretary of the Treasury, which I at once requested, and have received a letter requiring me to ascertain size of proposed pipe and cost of changing it.—JAMES LIMBIRD, Custodian."

MR. H. F. COGGSHALL, Treasurer and General Manager of the Fitchburg (Mass.) Gas and Electric Company, informs us that the generating capacity of the gas plant is being increased by the construction of two new arches, each 7 feet 8 inches by 9 feet, to hold two benches of 6's, the same to be heated by means of the Snow half-generating furnace. These benches will be equipped with new hydraulic mains, dip pipes, etc. Two miles of new 8-inch mains have also been put down. In connection with the Company's electric plant it has been found necessary to install two 50-light arc dynamos, and to place 15 miles of new construction work. These additions were necessitated by the contract with the city authorities for 56 arc lamps over the number formerly in use. This contract, which is to run for three years, calls for the maintenance of 156 arcs (1,200-candle power nominal), to be lighted one-half hour after sunset each night in the year, and to be extinguished at 1 A.M., the payment therefor to be at the rate of $85 per lamp per annum. The Company prospers exceedingly—the natural result of Treasurer Coggshall's carefulness and cleverness.

THE Board of Gas Trustees, of the Wheeling, W. Va., municipal gas works, have made their contract for a supply of gas coal for the ensuing year. The successful bidder was Mr. Henry Florsheim, who agreed to deliver 18,000 tons or more of standard gas coals at the rate of $1.34 per ton. The price paid last year was $1.45. Think of it, the best gas coal in the market for $1.34; and yet Wheeling points with pride to her 75 cent gas rate. The residual products ought to more than pay for the coal, there are no taxes to be charged against the property or product, and yet Wheeling is quoted as the bright, particular star in the galaxy of municipal lighting works in America!

MR. C. R. DINSMORE has resigned the Superintendency of the Marblehead, Mass., gas works.

THE Berlin Iron Bridge Company, of East Berlin, Conn, on Saturday last shipped 23 car loads of iron building material, at one consignment, by a special train over the New York, New Haven and Hartford Railroad, for the Companhia Nacional de Fojas e Estaleiras, Rio de Janeiro, Brazil, S. A. This is one of the largest single shipments that ever passed through New England, the combined weight of the 23 cars being nearly 1,000,000 pounds. The material goes by rail to the Harlem River, New York, and is there lightered aboard a Brazilian steamer for transportation direct to Rio de Janeiro. The material is to be used in the construction of a car works for the Companhia Nacional, etc. Not only will the building be constructed from American material, but all the tools and machinery also for the entire equipment will come from this country.

THE electric lighting station of the Clinton (Mass.) Gas Company is to be considerably enlarged.

TOWARDS the close of September suit was entered in the Common Pleas Court, of Philadelphia, against the city to recover $1,000 damages, by Mrs. Susanna Kuch. Complainant alleges that she is the owner of property on the northwest side of Leverington avenue, upon which ground stands a handsome house in which she makes her residence. The beauty of the premises and the value of the house were greatly increased by the presence of several handsome Norway maple trees planted by the plaintiff about 20 years ago. Last fall the gas main running through Leverington avenue commenced to leak and through the neglect of the city officials that leak remained unremedied until last May, and the soil of the street became permeated with gas which so affected the maple trees that they withered and died, thus becoming blots on the property instead of ornaments. The plaintiff asserts that the value of her property has been greatly decreased by the loss, hence the suit.

ACCORDING to recent Philadelphia advices the First Nationalist Club of that city has issued a circular to the residents, of which the following is a copy: "To the Select and Common Councils of the City of Philadelphia—We, the the undersigned citizens of Philadelphia, do hereby respectfully petition your honorable bodies for a reduction in the price of gas to a sum, as nearly as can be ascertained, equal to the actual cost of production and distribution, with the necessary allowance for extension of the system and for repairs. To aid in accomplishing this object we would also petition that the various city departments be charged cost price for the amount of gas consumed by them. It is well known that gas can be made and delivered at a much lower price than $1.50. In some cities it is now furnished at $1, and still pays a fair profit to the companies. The last report of the Director of Public Works gave as the cost to the department, counting all the expenses of production, distribution, repairs and extension of the system, as being about 84 cents per 1,000. It is believed that the reduction of the price to about $1 per 1,000 would lead to its adoption by most of the families not now using it. Think what a saving of labor this would effect for toiling womanhood. As to the profit the much greater amount used would largely compensate for the reduction in price, so that the aggregate profit would not be greatly affected. However, a still further reduction to the cost price would result in still further extension of its employmet for purposes for which it is now used; for example, as a convenient and desirable fuel for cooking, heating and manufacturing purposes. It has been proven that gas at $1 per 1,000 is a cheaper fuel than coal at $5 per ton. But expert gas men assert that gas can now be made and distributed at prices ranging from 35 to 50 cents per 1,000 feet. Then, this city, making all proper allowances, ought to be able to afford gas to its citizens at not more than 75 cents per 1,000. It has been objected that, by a reduction in the price of gas, the profits thus decreased would have to be made up by increased taxation. To this it may be replied that a small profit on a very large consumption will equal or exceed the prohibitive profit on the present limited consumption. Also, that now we are paying for all this convenience and not getting it. If we must pay for it in some form or other, by all means let us get the benefit of it. Is it right that those who burn gas should not only pay for the gas, but be compelled, as a penalty in addition, to pay other people's taxes also?" The Committee in charge of the petition is as follows: J. J. Taylor, M. D., Chairman, 1,520 Chestnut street; H. J. Doucet, M. D., and Mrs. E. O'Neal.

WE understand that the people of Eberton, Ga., have voted to bond the city in $40,000, for the purpose of establishing a water works and an

electric lighting station. Contractors in these lines can obtain the details by writing to the Mayor.

A CORRESPONDENT at Rochester, N. Y., says that a meeting of the Board of Trustees of Geneseo, N. Y., was recently held for the purpose of considering whether it would be advisable to engage the town in the operation of a municipal lighting (electric) works, the project having originated with a certain Mr. Brady, who, it is said, represents an Eastern firm engaged in the manufacture of electric lighting apparatus, etc. After the question had been gone over at great length a resolution was introduced by Mr. Reed to the effect that a special meeting of electors be called by the Trustees for Oct. 13, on which date the question might be submitted to them. Embodied in the resolution was Mr. Brady's proposition, which, in substance, was to construct a plant equal to the maintenance of 32 arc lights, of 1,200 candle power each, for the sum of $12,000. Mr. Brady assured the Trustees that this number of arcs would be ample to light the place thoroughly. The resolution was adopted, whereupon Messrs. Reed and Strong were appointed a committee to draft an agreement on the basis proposed for the action of the voters.

FROM the report made by Marshal W. E. Moutz respecting the recent sale at auction of the property and effects of the Citizens Gas Light Company of Louisville, Ky., it was determined that the property was purchased by the Louisville Gas Light Company, at its bid of $250,000. This formally perfects the Louisville Company's title to all the belongings of its one time rival, which have in reality been in the former's possession and ownership for quite a while.

THE following propositions were submitted by the Milwaukee Gas Light Company for a renewal of the contract on public lighting account: On the basis of a one year contract, gas to public buildings, 90 cents per 1,000; lamps with 5-feet burners, $24.17 per annum; 6-feet burners, $27; three year contract, 85 cents, $23.21, and $26.46 respectively; five year contract, 80 cents, $22.36, and $25.31 respectively. Low rates, these.

ACCORDING to the Albany (N. Y.) *Journal* negotiations are in progress for the transfer of the plant of the Troy Electric Light Company, now owned by Anthony N. Brady, to the Troy Gas Company. The plant was purchased by Mr. Brady, at auction, for $90,000, which amount was not sufficient to liquidate the indebtedness that attached to its operations under its former owners. At a recent meeting of the Gas Company a committee was appointed, of which Mr. William A. Thompson is chairman, to negotiate with Mr. Brady for the purchase of the Electric Light Company's possessions. Mr. Thompson said that the transfer had not yet been made, but that it might be effected at the Gas Company's meeting in October. The committee, though, might be obliged to ask for further time, as there was a mass of details and legal complications to be gone through before matters could be placed in position for a transfer. The sale, however, would undoubtedly take place, but Mr. Thompson was unwilling to state what the amount of the purchase money would be, or whether any sum had been fixed. From other sources statements were obtained fixing the purchase price at $240,000 or $250,000. The Gas Company will assume certain obligations of the other corporation, and will issue bonds for $130,000 to complete the purchase. Some of the Directors were at first inclined to favor the issue of additional stock rather than bonds, but the other course will be followed.

THE Union Gas Light Company, whose operations are confined to that portion of Brooklyn formerly known as East New York, and which will be consolidated with the Citizens Company, of Brooklyn, has placed a contract with the Logan Iron Works for the construction of a new gasholder, calculated to store 500,000 cubic feet. It will rest in a steel tank. The Company's business is growing very rapidly.

THE residents of South Chicago, Ills., are talking about "boycotting" the Peoples Light and Power Company on the ground that its charges for gas and arc lights are excessive. The gas rate is $2 per 1,000.

THE Chicago *Post* says that another scare is charged to the account of the Economic Fuel Gas Company, but this time the scare is confined to the ducks that inhabit the Calumet marshes. The Tolleston Club has appeared before the Superior Court and represents that it owns 2,200 acres of marsh land along the Calumet, and that it has improved it for hunting purposes to the extent of $250,000. The Club further says that the Indiana Natural Gas and Oil Company, or the Economic Fuel Gas Company, is about to spoil the hunting by putting a force of men at work laying pipes across the Club marsh. The members once gave the Company permission to lay the pipes, but stipulated that no work should be done during the hunting season. Fearing that this agreement was about to be violated, the Club asks the Superior Court to enjoin the Company from frightening the ducks.

THE following resolutions were adopted by the Board of Directors of the Nashville (Tenn.) Gas Light Company, respecting the late Mr. Samuel Prichitt:

"At a called meeting of the Directors of the Nashville (Tenn.) Gas Light Company, held yesterday, the following resolutions were passed relative to the death of the President, Samuel Prichitt:

"*Whereas*, Providence has removed from among us our late associate and President, Samuel Prichitt, who was connected with this Company as a Director from its organization, and for many years its President, in whom we recognized a man of fine ability, sterling integrity and great worth, we deeply deplore his sudden and unexpected death.

"*Resolved*, That we tender his family our sincere condolence in the irreparable loss which they have sustained.

"*Resolved*, That these resolutions be spread on the minutes of the Company, and a copy thereof be sent to the family.

"THOS. F. KENDRICK, Secy. THOS. PLATER, Pres., pro tem."

Resolutions similar in tenor to the above were also adopted by the Tennessee Manufacturing Company, and by the Nashville Merchants' Exchange.

THE Modesto (Cal.) Gas Light Company offers to supply the town with any required number of gas lamps for the public lighting on the basis of a charge of $4 per month per lamp, moon schedule, or $6.50 per month on a lighting table, beginning with dusk and terminating at daylight. The Modesto Electric Light Company proposes to supply 20-candle power incandescent lamps, at the rate of $5.50 per light per month, moonlight schedule, or $7.50 per light if the longer schedule is insisted upon.

THE Oakland (Cal.) Gas Light and Heat Company has made application to the Trustees of Alameda City for the right to supply the residents with an incandescent electric lighting service.

MR. HARRY HOADLEY has been appointed Superintendent of the Cumberland (Md.) Gas Company, and we congratulate him upon his well-earned promotion. Mr. Hoadley was for several years in the service of the Allegheny (Pa.) Heating Company, and subsequently was assistant to Mr. Peter Young, Engineer and Superintendent of the Knoxville (Tenn.) Gas Light Company. The Messrs. Young have good reason to be proud of their pupil, who has profited by their careful training, and it may be taken for granted that the Cumberland Company will prosper anew under his management. Mr. Hoadley will have full charge at Cumberland, and we join with his many friends in wishing him the best of success in his new field of labor.

THE authorities of Louisville, Ky., have requested the proprietors of the local consolidated street car company, which is operated by electricity, "to furnish without charge the city with sufficient electricity to light or illuminate the intersections of all streeets along which their electric lines run. And that if they consent to do so, be it further resolved that the Mayor be empowered and requested to erect suitable electric lamps and poles at such intersections of streets as may be necessary to utilize said electricity and light said localities." When the resolution was put before the General Council Mr. Weaver, who offered the matter to his colleagues, explained that as the car company "was getting electricity along all the streets," and as it "had never paid anything for its franchise it was time it did something for the city," hence he hoped the resolution would pass. Mr. Davis thought the proposition would interefere with the lighting contract held by the Louisville Gas Company, and Mr. Stoll agreed with Mr. Davis. The proposition finally was referred to the Railroad and Street Committee.

MR. WEAVER'S proposition certainly seems to possess the merit of novelty; but will it stand the test of actual working?

THE Rutland (Vt.) Electric Light Company has increased the rates for its commercial arc lighting service.

THE Chattanooga (Tenn.) Electric Light Company proposes to abolish the contract system, substituting a meter service therefor.

MR. C. E. STANLEY, formerly Secretary of the Cleveland, Ohio, Gas Light and Coke Company, died suddenly at Passedena, Cal., last month.

THE Directors of the Greenfield (Ind.) Natural Gas Company have ordered the following changes in the rate schedule, to take effect immediately: First heater, $1; second heater, 75 cents; third heater, 50 cents; cooking stoves, 75 cents. The figures indicate an advance of about 50 per cent. over those formerly in vogue.

SUPPLEMENTING our former "item" respecting the annual meeting of the Providence (R. I.) Gas Company, we give the following further extracts from the Treasurer's annual report, and acknowledge our indebtedness therefor to the courtesy of Mr. Slater: "The reasons given in our last report for ordering that plant [a water gas annex], while good in general, had special force and urgency in view of the strike in the coal mines, then closing the fourth month of its duration and still vigorous. The works were completed and started in April last, and have been in moderate but constant and successful operation since. A 'monopoly' for the supply of water or gas to a city like this may be and usually is a good thing, for the supply of neither can be opened to general competition, like supplies of food and raiment, with advantage to the citizens. In the supply of water to the citizens of Providence the corporation of the city has become the monopolist; which work it would not have undertaken had it seemed possible that the Legislature would in a short time seriously consider an application from citizens or strangers, few or many, to admit them as competitors for this supply on the general plea, unsupported by proof, that they could distribute better water at a cheaper rate. Had the city so chosen, it might have had the same monopoly in the supply of gas. When the charter of this Company was granted in June, 1847, some of our largest capitalists declined to subscribe for stock. The subscription book was not only open to all, but was pressed upon all. The book shows 57 subscribers for 671 shares, amounting to $33,550. The largest subscription was for 100 shares at $50 each, and one-half the subscriptions were for only two to five shares each. Surely, these men were not 'greedy monopolists.' Application was made to the Legislature for amendment to charter. This amendment, granted in January, 1848, allowed a reduction of the capital from $100,900 to $50,000, and also allowed the city of Providence to subscribe for stock in the Company without limit to the amount, and provided that it should forever be exempt from all individual liability for the debts of the Company. This Company accepted these amendments, with that clause of exemption, willing to be individually bound for corporate indebtedness while the city was exempt though it might hold more stock than they all. But with this favorable condition the city still declined, and the subscription for stock was filled by the gentlemen from abroad, who contracted to furnish the machinery and apparatus, they taking about one-third of the whole $50,000 capital. We again submit that if the organizers of this Company were monopolists they were in no sense 'greedy monopolists.' Nor are their successors now deserving of that opprobrious cognomen. Our stock has never been watered. The $2,500,000 which it represents has been paid in, in cash, to the uttermost farthing. Our dividends, as compared with those of like companies in this and other countries, have been modest. Our first semi-annual dividend, delayed until July, 1849, was 1½ per cent. Of the 42 years which have followed, the dividends for two years have been at the rate of 6 per cent. per annum; two others at the rate of 7 per cent.; 26 others at the rate of 8 per cent.; one at the rate of 9 per cent.; and 10 at the rate of 10 per cent. There have also been three special dividends made largely from money saved by insuring our own property on land and water, but these, as also the 10 per cent. dividends, were made during that long term of 18 years, covering and following the war of the Rebellion, when specie payments were suspended and the currency was so greatly inflated that a double dividend would have been justified in us, such as was then being enjoyed by most other manufacturers. Such a history ought to save this Company from such calumny as we have alluded to, and should secure from the city and State protection from assaults upon its property and good name, made or inspired by speculators from abroad, who bring nothing in reputation gained from past achievement to entitle them to even a respectful hearing. Despite their false assertions we aver that we can give and do give both coal and water gas of as good quality as can be found; that to prevent leaks, so harmful and dangerous to the city, our mains are inspected by our paid agent at the foundries where they are made (all imperfect pipes being rejected), and are laid under the supervision of this inspector with the greatest care; that we carry supply pipes within the walls of every man's house, without charge for these supplies, and also furnish meters without charge: that we furnish gas in the suburbs of the city and in all the towns that join us on every side, both for houses and highways at the same price as in the center of the city. We may say unhesitatingly that no equal service is voluntarily given (if given at all) by any company in this country at a lower price. We also aver that no competitor we have had has been able to compete with us at a living profit, or at any profit. Both companies that tried the operation lost money every day they were in operation. Satisfied with modest dividends we expect to be able to keep our prices so low that every new speculative adventurer will share the same fate."

ANOTHER explosion in a bank vault lighted by gas is reported, this time from Concord, N. H. Arthur C. Dole, a clerk, believing that gas was escaping in the vault, lighted a match to assist him in ferreting out the leak. He found it, of course, but with sad consequences to the whiskers that adorned his face.

EVIDENTLY the Toledo (Ohio) Gas Light and Coke Company has nothing to conceal, since it has freely and fully placed before the Committee on Gas, of the City Councils, all its books, accounts and papers, in furtherance of the attempt between the authorities and the Company to arrive at a gas rate that shall be just and equitable as between the producer and consumer.

THE New Bedford (Mass.) Gas and Electric Light Company is laying a 3-inch pipe line, for the purpose of conveying underground, from the tank cars to its oil storage tanks, its oil supplies.

WE understand that the authorities of Milford, Del., have purchased the electric lighting plant heretofore operated in that city by the Johnson Brothers, and that it will be maintained on municipal account. The Johnsons admit that they could not make any money at the rates charged.

New Process for Toning Blue Prints.

Dr. W. P. Jenney, in calling attention to this subject, in a recent issue of the *Scientific American*, remarks that the intense blue color of the ordinary blue print gives unnatural effects in prints from photographic negatives: also in architectural drawings where views and elevations of buildings are reproduced. The following method of toning such blue prints has been found to be easy of application and to give tones varying from a brilliant blue through violet blue to neutral tint and warm shades of gray, according to the intensity of the action of the bath.

The paper employed may be common blue print paper, sold ready for use in rolls, or the specially made paper sold in packages of cut sheets by the dealers in photographic supplies. The solar printing is carried out in the usual manner. The best results are obtained with dark prints, as the intensity of the color is somewhat reduced by the toning process. The following baths are employed:

Bath A.

Muriatic (hydrochloric) acid	3 to 4 drops.
Water	16 oz. (1 pint).

Bath B.

Aqua ammonia	5 to 10 drops.
Water	16 oz. (1 pint).

Bath C. Apoth. weight.

Alum	2 oz.
Tannic acid	1 drachm.
Water	16 oz. (1 pint).

The prints are immersed face downward in bath A until all the soluble salts contained in the paper are dissolved and removed, then dipped into bath B until the negative turns a violet blue and the whites are clear, care being taken that the immersion in the ammonia be not continued too long, as the definition of the picture may be injured. The prints are transferred from the ammonia bath, placed face upward in a tray filled with bath C, and exposed to bright sunshine for from 5 to 10 minutes, until no increase in the strength of the picture can be noticed. The pictures are finished by toning in bath B until the desired shade of color is obtained, the picture becoming first a brilliant blue, then violet, and finally, by prolonged action, blueish gray or neutral tint. The toning may be varied by a second immersion in the tannic acid bath C, followed by a second toning in bath B. After toning the prints are dried in the sunlight in the usual manner.

The above process is specially applicable to prints from photographic negatives, enabling the amateur in the field, provided with a printing frame, some sheets of prepared blue print paper, and the above easily procured chemicals, to test the printing quality of his negatives with results only slightly inferior in detail and definition to those obtained by the complicated process of silver printing.

The Market for Gas Securities.

The city market for gas shares is steady and dull, with Consolidated at about the prices that prevailed last week. To-day (Friday) the opening figure was 98½ to 99, but some transfers were made meantime at 99. There is but very little floating stock on the market, investors having quietly taken it in. Equitable sold at auction this week at 119, and it is worth more money.

Over in Brooklyn the situation remains practically unchanged, but there is an unmistakable development of greater confidence. Holders are not at all disposed to accept anything like the bid rates, and the declaration by the Fulton-Municipal Company of a quarterly dividend of 2 per cent. (it is payable on October 15) shows that there is some money in gas at $1.25 per 1,000 in Brooklyn. It is true that this is quite a cut from the former annual rate of 10 per cent., but, again, the latter was perhaps a trifle high, from the consumer's standpoint at any rate. Chicago gas is fairly strong at 50¾ to 51, while Laclede is not so much in demand, even at a considerable falling off from the quotations of a week ago.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

October 5.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	98½	99
Central	500,000	50	--	90
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	119	121
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	119	121
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	—	48
Preferred	5,000,000	100	—	90
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	100
Citizens	1,200,000	20	88	90
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	112	115
" Bonds	300,000		100	105
Peoples	1,000,000	10	60	65
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	90	95
" Bonds (5's)	70,000	—	—	—
Nassau	1,000,000	25	125	—
" Ctfs	700,000	1000	98	100
Williamsburgh	1,000,000	50	100	—
" Bonds	1,000,000	—	105	109
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	—	84½
2d " " "	3,000,000	1000	70	—
Bay State Gas Co.—				
Stock	5,000,000	50	56	58
Income Bonds	2,000,000	1000	98	102
Buffalo Mutual, N. Y.	750,000	100	105	110
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds.	45,000	—	—	—
Chicago Gas Company.	25,000,000	100	50⅝	50¾
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	83	83⅞
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	—	100½
Consumers Gas Light Co., Jersey City	2,000,000	100	12	15
Bonds	600,000	1000	70	75
Cincinnati G. & C. Co.	7,000,000	100	—	200
Consumers Toronto	1,000,000	50	169	172
Central, S. F., Cal.			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	45½	45¾
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	110
Bonds	250,000		—	—
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn.	750,000	25	109	114
Jersey City	750,000	20	165	170
Louisville, Ky.	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	19	19¼
Preferred "	2,500,000	100	—	—
Bonds	9,034,400	1000	77½	78

Position Wanted

As Superintendent of Gas Works or Construction Co.

By a man of experience in the construction of gas works, and also in manufacture and distribution of gas. Best of references given. Address

849-4 "W. S.," care this Journal.

To Gas Companies.

We make to order **CAP BURNERS** to burn any amount under a stated pressure. Send for samples.

Also, SERVICE CLEANERS, DRIP PUMPS, and STREET MAIN PROVING APPARATUS.

C. A. GEFRORER,

248 N. 8th St., Phila., Pa.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

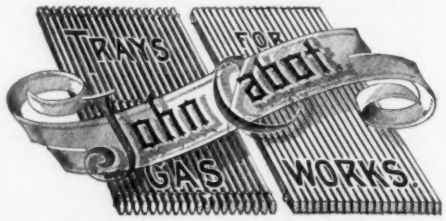
Not Expensive. Write to

STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

Special Trays for Iron Sponge or Oxide of Iron.

CHURCH'S TRAYS a Specialty.

Reversible, Strongest, Most Durable. Most Easily Repaired.



306-310 Eleventh Avenue, New York.

We also make the Cheapest and Strongest REVERSIBLE BOLTED TRAYS IN THE MARKET.

Send for Circulars.

MOSES G. WILDER, MECH. ENGR.

816-18-20-22 Cherry St., Phila., Pa.

Volumetric Lamp Governors

FOR GAS LAMPS & HIGH-POWER BURNERS.

Governor Burners for Street Lamps & General Use

GOVERNORS FOR ARGAND AND OTHER COMMON GAS BURNERS IN ALL SIZES.

Horizontal Governors

Specially Adapted for Gas Stoves, Furnaces, etc.

It is well known that a large majority of all High Power Gas Lamps in the United States have my Governors attached, and they are always used by the leading makers of these lamps. To remove any excuse for the use by anyone of inferior and infringing Governors, a reduction in price has been made, and all exclusive contracts are cancelled.

Correspondence Solicited with all who require a Reliable Governor.

The Weston Standard

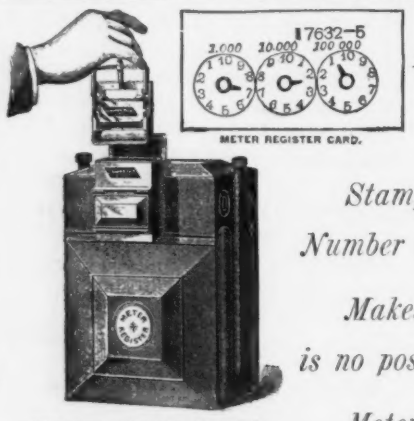
VOLTMETERS AND AMMETERS.

These Instruments are the most accurate, reliable, and sensitive portable instruments ever offered. A large variety of ranges, to meet the requirements of all kinds of work.

Send for Catalogue.

Weston Electrical Instrument Co.,

Office & Factory, 114-116 William St, Newark, N. J.



Meter Register.

Stamps the Dials and Pointers and the Number of the Meter on a card.

Makes a permanent reading in which there is no possibility of a mistake.

Meter reader cannot enter readings in the route book without going to the meter.

METER REGISTER CO.,
52 ILLINOIS ST.,
CHICAGO.

The Nineteenth Annual Meeting of the American Gas Light Association

Will be Held at New York, Oct. 21, 22 and 23.

HEADQUARTERS AT THE HOLLAND HOUSE, Fifth Ave. & 30th St.

Each application for membership (Active or Associate), or for transfer from Associate to Active, must be completed and in the hands of Acting Secretary at least ten days before meeting. Each application must be endorsed by two Active Members of Association to be complete.

No payment for initiation fee required in advance.

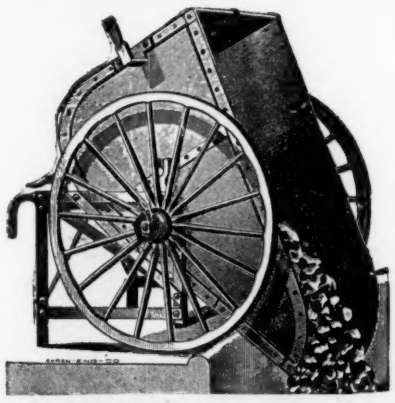
"To be *eligible* as an *Active Member* a person must be a president, secretary, treasurer, engineer, consulting engineer, or superintendent of a gas company, or a manager of a gas works."

"*Associates* shall be persons holding a responsible position in a gas works, or persons whose pursuits constitute branches of gas engineering, or who are otherwise qualified to assist in promoting the objects of the Association."

Application blanks may be obtained of the Acting Secretary,

ALEX. C. HUMPHREYS, Drexel Building, Phila., Pa.

McNeil's Balanced Charging Barrow.



UNSOLICITED TESTIMONIAL.

POUGHKEEPSIE, N. Y., July 25, 1891.

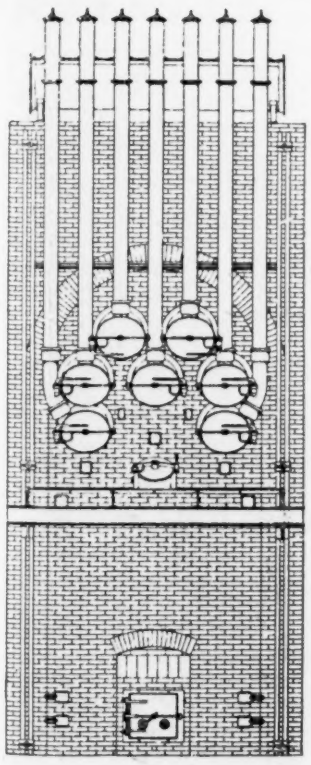
MR. GRANT MCNEIL: Dear Sir—We find, after using your dumping barrow for over a year, that it is as good as when we got it. It paid for itself in three months. We cannot recommend it too highly. We handle broken coal, which will wear out an ordinary barrow in two years. Yours truly,

POUGHKEEPSIE GAS COMPANY.

Only perfect satisfaction could induce a man to voluntarily send a letter like that.

GRANT McNEIL, 225 N. Union St., Akron, O.

LACLEDE FIRE BRICK MANUFACTURING COMPANY,



ST. LOUIS, MO.

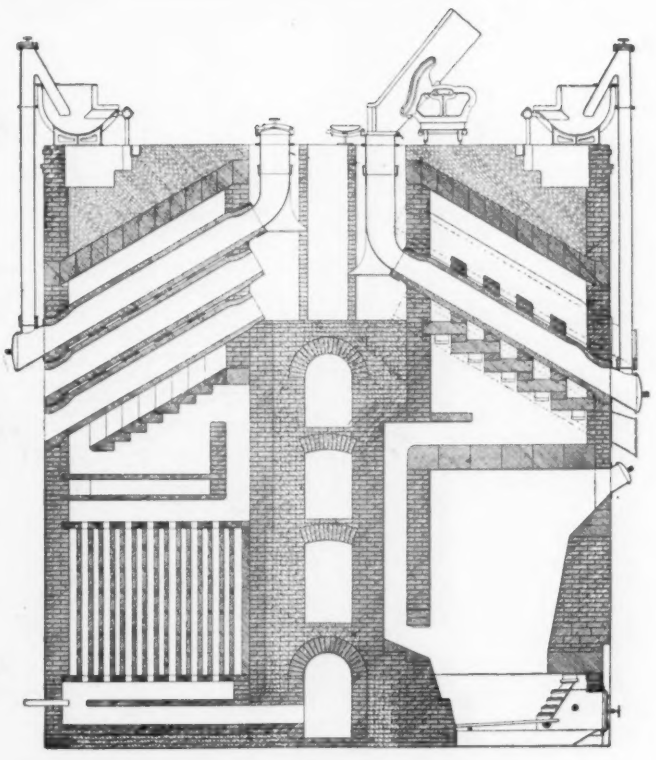
Exclusive Agents in the United States

FOR THE

Coze System of Inclined Retorts.

IT IS THE COMING BENCH FOR MAKING COAL GAS.

It will Save from 50 to 60 per ct. in Labor.



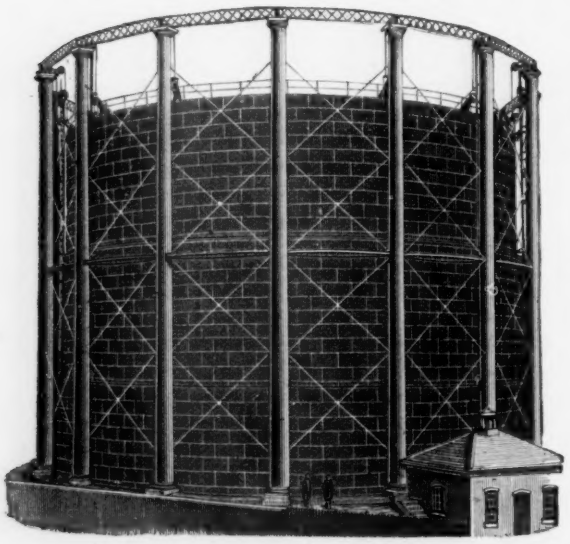
ESTIMATES AND PLANS FURNISHED BY THE

LACLEDE FIRE BRICK MFG. CO., ST. LOUIS, MO.

The Continental Iron Works

THOS. F. ROWLAND, President. THOS. F. ROWLAND, Jr., Secretary & Treasurer. WARREN E. HILL and CHAS. H. CORBETT, Vice-Presidents.

Take 10th or 23d Street Ferries from New York to Greenpoint. **BROOKLYN, N. Y.**



BUILDERS OF

GAS HOLDERS,

SINGLE-LIFT and MULTIPLE-SECTION GAS HOLDERS A SPECIALTY.

Wrought Iron Gas Holder Tanks.

BENCH CASTINGS, RETORT LIDS,

Hydraulic Mains, Condensers, Scrubbers,

PURIFIERS, VALVES, Etc.

SELF-SEALING
Retort Mouthpieces and Lids.

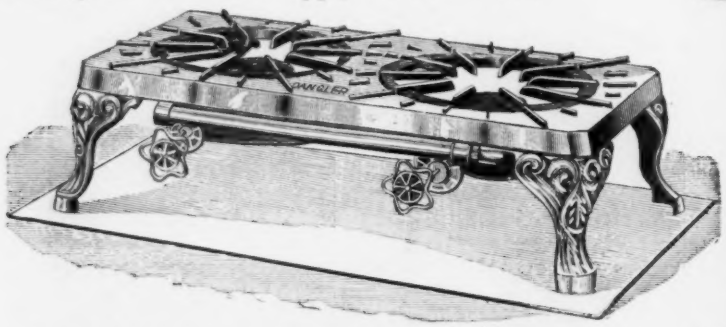
For Round, Oval, or "D" Retorts.

THE DANGLER GAS RANGES AND STOVES.

In calling the attention of those interested to our perfect working GAS STOVES AND RANGES, after a thorough and rigid trial of years, we have the unqualified assurance from the heads of over 6,000 households that our GAS RANGES AND STOVES are a perfect success for baking, cooking, broiling and roasting, and our

HOT WATER DEVICE

is a marvel of convenience and economy, furnishing an unfailing supply of hot water.



Our line includes all the different styles of Ranges and Stoves, and we call special attention to our

Hot Plates,

which are especially popular on account of the size and style, and finished either in nickel or polished iron.

We invite correspondence and send Catalogues on application.

New York Show Rooms, 40 & 42 College Place. **THE DANGLER STOVE AND MFG. CO., Cleveland, O.** THOS. HOLT, 111 & 113 N. 2d St., Phila.

Standard Oil Company,

GAS NAPTHA DEPARTMENT OF THE WEST.

GAS NAPTHA.

GAS OIL.

Correspondence Solicited.

CLEVELAND, OHIO.

CHAPMAN VALVE MANUFACTURING CO.,

MANUFACTURERS OF

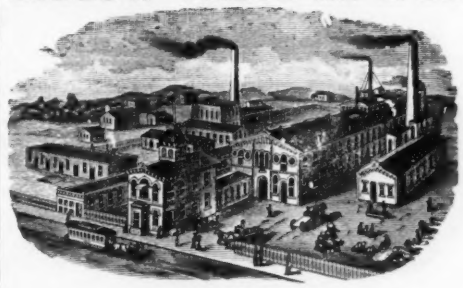
Valves and Gates for Gas, Ammonia, Water, Etc.

Also, Gate Fire Hydrants With and Without Independent Nozzle Valve. All Work Guaranteed.

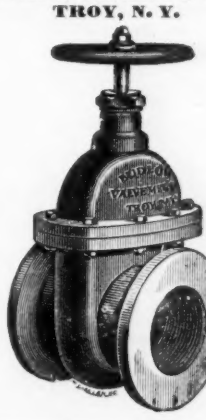
WORKS & GEN'L OFFICE: Indian Orchard, Mass.

TREASURER'S OFFICE: 72 Kilby & 112 Milk Sts, Boston, Mass.

LUDLOW VALVE MFG. CO.



OFFICE AND WORKS,
938 to 954 River Street and 67 to 83 Vail Av.,
TROY, N. Y.



Hydraulic Main Lip Regulators, also Check Valves, Foot Valves, Yard-wash and Fire Hydrants.

Send for Circulars.

Valves.—Double and Single Gate, ¼ in. to 48 in., outside and inside Screws. Indicator, etc., for Gas, Water, Steam, and Oil.

Send for Circulars.

Parson's Steam Blower,

FOR IMPROVING BAD DRAUGHT IN BOILERS, AND FOR BURNING BREEZE OR OTHER WASTE MATERIAL.

PARSON'S TAR BURNER,

FOR UTILIZING COAL TAR AS FUEL.

PARSON'S AIR JET TUBE CLEANER,

FOR CLEANING BOILER TUBES.

These devices are all first-class. They will be sent to any responsible party *for trial*. No sale unless satisfactory. Manufactured by the WATERTOWN STEAM BLOWER COMPANY.

H. E. PARSON, Supt., No. 54 Pine St., N. Y.

JEWEL GAS STOVES

MANUFACTURED BY

GEORGE M. CLARK & COMPANY,

157 & 159 Superior Street, - Chicago, Ill.

EVERY CONCEIVABLE SIZE AND STYLE.

Ranging in Prices from $1.50 to $37.00.

WE USE NO GAS COCKS.

All Flames are Regulated by a Direct Needle Valve.

The JEWEL

IS THE

Only Well-Made Gas Stove on the Market.

Write for our 1890 Catalogue and see for yourself.

Jewel Circulating Water Heater. $15.00.

THE BERLIN IRON BRIDGE CO.

The above illustration shows the construction of a Machine Shop built by us for the Link Machinery Company, at Chicago, Ill. The wings of the building are two stories high, but the central portion is only one story in height—this being controlled and served by a hydraulic traveling crane running the full length of the building. *Write for Illustrated Catalogue.*

Office and Works, EAST BERLIN, CONN.

AGENCIES.—S. W. BOWLES, JR., Western Mangr., 556 Rookery Building, Chicago, Ill. W. E. STEARNS, 318 Odd Fellows Building, St. Louis, Mo.

GASHOLDER PAINT.

Use Only

THE GOVERNMENT WATERPROOF PAINT.

Proof against Ammonia, and Absolutely Waterproof. Send for Prices and Particulars.

THE GOVERNMENT WATERPROOF PAINT CO., 122 Milk Street, Boston, Mass.

Fuel and Its Applications

By E. J. MILLS, D.Sc. F.R.S., and F. J. ROWAN, C.E., assisted by others, including Mr. F. P. Dewey, of the Smithsonian Inst., Wash., D. C.

7 PLATES, AND 607 OTHER ILLUSTRATIONS. ROYAL OCTAVO, PAGES XX, 802. HANDSOME CLOTH, $7.50.

A. M. CALLENDER & CO., 32 Pine St., N. Y.

Water Gas! Fuel Gas!

For all Manufacturing Purposes. Generated from Bituminous Slack, Anthracite Coal Dust, or Coke Breeze, by

THE LOOMIS PROCESS.

Now in successful operation at Works of John Russell Cutlery Co., Turner's Falls, Mass., and Henry Disston's Sons' Saw Works, Tacony, Pa.

The Cheapest Gas Generating System in the World.

Utilizing any Kind of Low-Priced Coals.

NOVEL IN DESIGN, MODERN IN CONSTRUCTION, SIMPLE IN OPERATION, PERFECT IN RESULTS.

Plans and Estimates Furnished.

BURDETT LOOMIS, - - Hartford, Conn.,

Or Murray Hill Hotel, New York City.

King's Treatise on Coal Gas.

In Three Volumes. Price per Vol., $10. Sold either by Volume or in Sets.

A Standard text-book for the Engineers and Managers of Gas Works, and for all who are concerned or take an interest in the manufacture and distribution of Coal Gas, and in the utilization of the Secondary Products resulting therefrom; treating also of the Gas Engine, and of Gas Cooking and Heating Appliances.

A. M. CALLENDER & CO., 32 Pine Street, N. Y. City.

GAS STOVES. GAS METERS. GAS STOVES.

THE AMERICAN METER CO.

Established 1834. Incorporated 1863.

MANUFACTURERS OF

Standard 3 Diaphragm Dry Meter.

Gas Meters,

STATION METERS,

METER PROVERS, PHOTOMETERS,

Experimental Meters of all Kinds,

AND

Standard 2 Diaphragm Dry Meter.

Apparatus for Testing the Quantity and Quality of Gases.

Meters for Measuring Natural Gas.

MANUFACTORIES,

508 to 514 West Twenty-second St., N. Y. Arch and Twenty-second St., Phila.

Nos. 244 & 246 North Wells Street, Chicago, Ill.

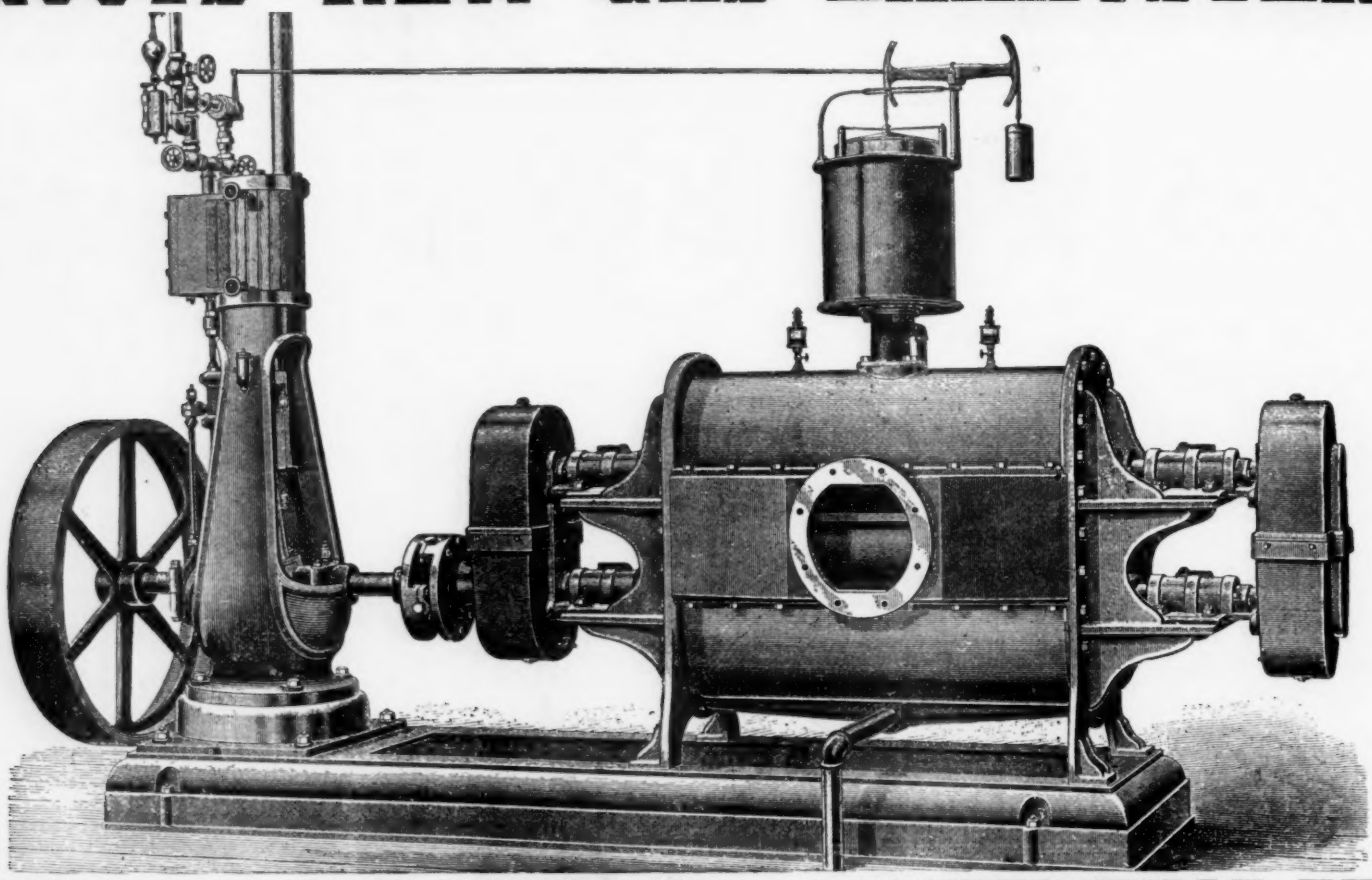
AGENCIES,

No. 177 Elm Street, Cincinnati, Ohio. No. 222 Sutter Street, San Francisco, Cal.

No. 810 North Second Street, St. Louis, Mo.

GAS STOVE SHOW ROOMS, No. 242 Sixth Avenue, New York City.

ROOTS' NEW GAS EXHAUSTER.



THE P. H. & F. M. ROOTS CO., - - CONNERSVILLE, IND.

S. S. TOWNSEND, Gen. Agt., COOKE & CO., Selling Agts., 163 & 165 Washington St., N. Y.

KIRKHAM, HULETT & CHANDLER'S NEW PATENT

"Standard" Washer-Scrubber.

Extracts the Whole of the Ammonia and a Large Percentage of the Sulphureted Hydrogen and Carbonic Acid.

MINIMUM WEIGHT IN MOTION • MINIMUM DRIVING POWER • MINIMUM BACK PRESSURE • MINIMUM WEAR AND TEAR • WITH MAXIMUM RESULTS.

The "New" Washer-Scrubber, with Wooden "Bundles," has been for many months in successful operation at the London Gas Light and Coke Company's station at Beckton, and at many other European Gas Works
The "Bundles" can be supplied to "Standard" Washer-Scrubbers already in use.

GEO. SHEPARD PAGE, Sole Agt. for Western Hemisphere, 69 Wall St., New York.

SCIENTIFIC BOOKS.

KING'S TREATISE ON THE MANUFACTURE OF COAL GAS. Three vols.; $10 per vol.

GAS MANUFACTURE, by WILLIAM RICHARDS. 4to., with numerous Engravings and Plates, in Cloth binding. $12.

TECHNICAL GAS ANALYSIS. $2.80.

GAS CONSUMER'S GUIDE. $1.

GAS MEASUREMENT AND GAS METER TESTING, by F. W. HARTLEY. $1.60

GAS CONSUMER'S HANDBOOK, by WILLIAM RICHARDS, C.E.; 18mo.. Sewed. 30 cents.

A PRACTICAL TREATISE ON GAS AND VENTILATION with Special Relation to Illuminating, Heating, and Cooking by Gas, by E. E. PERKINS. $1.25.

CHEMISTRY OF ILLUMINATING GAS, by NORTON H. HUMPHRYS. $2.40.

PRACTICAL TREATISE ON HEAT, by THOMAS BOX. Second edition. $5.

STRAINS IN IRONWORK, by H. ADAMS. With plates. $1.75.

GAS WORKS—THEIR ARRANGEMENT, CONSTRUCTION, PLANT, AND MACHINERY. $8.

COAL; ITS HISTORY AND USE, by PROF. THORPE. $3.50.

THE GAS WORKS OF LONDON. by COLBURN. 60 cents.

HEAT A MODE OF MOTION, by JOHN TYNDALL. $2.50.

MUNICIPAL LIGHTING, by F. H. WHIPPLE. $1.

GAS WORKS, AND MANUFACTURING COAL GAS, HUGHES. $2.30.

THE MANAGEMENT OF SMALL GAS WORKS, by C. J. R. HUMPHREYS. $1.

MANUAL FOR GAS ENGINEERING STUDENTS, by D. LEE, 40 cents.

THEORY OF HEAT, by J. CLERK-MAXWELL. $1.25.

THE DOMESTIC USES OF COAL GAS, AS APPLIED TO LIGHTING, by W. SUGG. $1.40.

DIGEST OF GAS LAW. $5.

DISTLLATION OF COAL TAR AND AMMONIACAL LIQUOR, by GEO. LUNGE. New Edition. $12.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS, by D. A. GRAHAM 8vo., Cloth. $3.

GAS COMPANIES DIRECTORY, 1891. $5.

THE AMERICAN GAS ENGINEER AND SUPERINTENDENT'S HANDBOOK, by WM. MOONEY. $3.

GAS ENGINE INDICATOR DIAGRAM, by W. E. AYRTON. Paper. 20 cents.

ILLUMINATING AND HEATING GAS, by W. BURNS. $1.50.

TESTING PIPES AND PIPE JOINTS, by M. M. PATERSON. 80 cents.

DESIGNING WROUGHT AND CAST IRON WORK, by H. ADAMS. Paper. Three parts, 60 cents each.

NOTES IN MECHANICAL ENGINEERING, by H. ADAMS. $1

The above will be forwarded by express, upon receipt of price. If sent by mail, postage must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order.

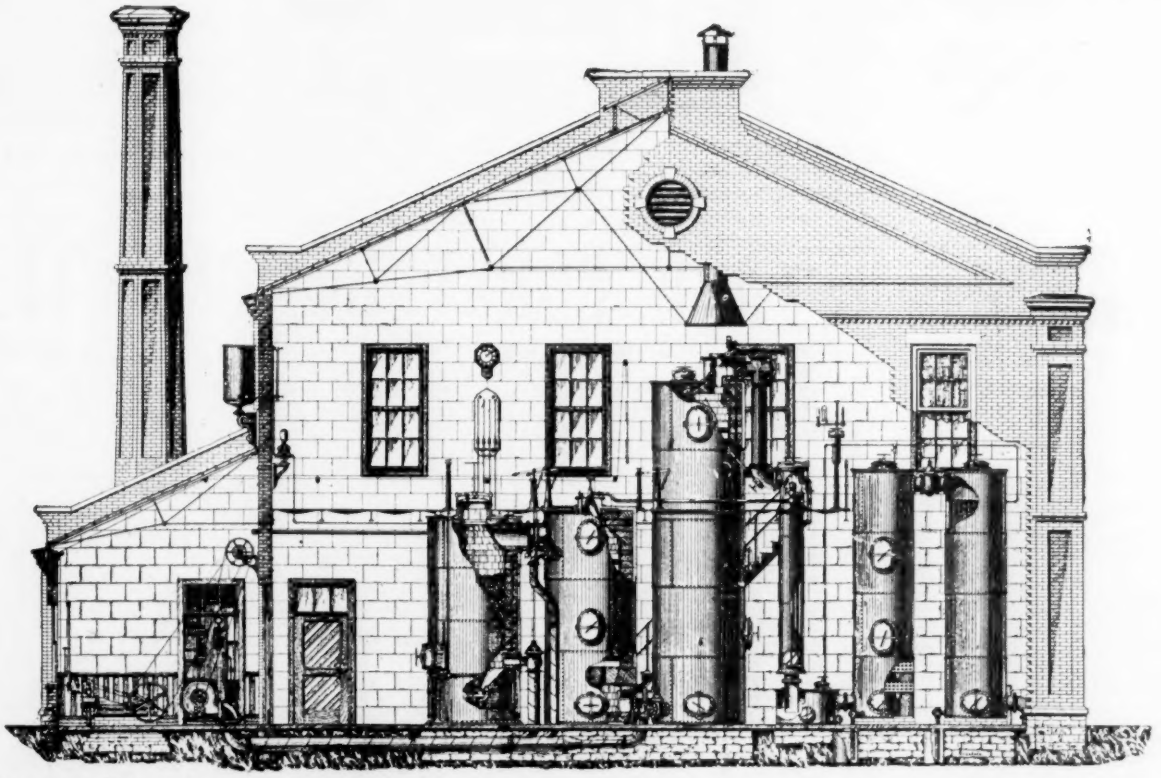
A. M. CALLENDER & CO., 32 Pine Street, New York.

THE UNITED GAS IMPROVEMENT CO.,

DREXEL BUILDING, PHILA., PA.

Owners of the Lowe, Granger-Collins, McKay-Critchlow (for carbureting Natural Gas), and Other Gas Patents.

BUILDERS, LESSEES and PURCHASERS OF GAS WORKS.



Standard "Double Superheater" Lowe Apparatus, Especially Designed for the Use of Lima Crude Oil.

Erectors of

WATER GAS PLANTS,

(Either Independent or Auxiliary to Coal Gas Works),

USING LIMA OR OTHER LOW GRADE OILS AND ANTHRACITE COAL OR GAS HOUSE OR OVEN COKE

PAMPHLETS, PLANS, AND ESTIMATES FURNISHED UPON APPLICATION.

NATIONAL
GAS LIGHT AND FUEL CO.,

No. 52 Lake Street, Chicago.

FRED'K H. SHELTON, Manager.

GAS WORKS

Built, Remodeled, Leased, or Purchased.

THE SPRINCER CUPOLA SYSTEM.

Also, by Special Arrangement with the United Gas Improvement Company,

AGENTS FOR THE WEST

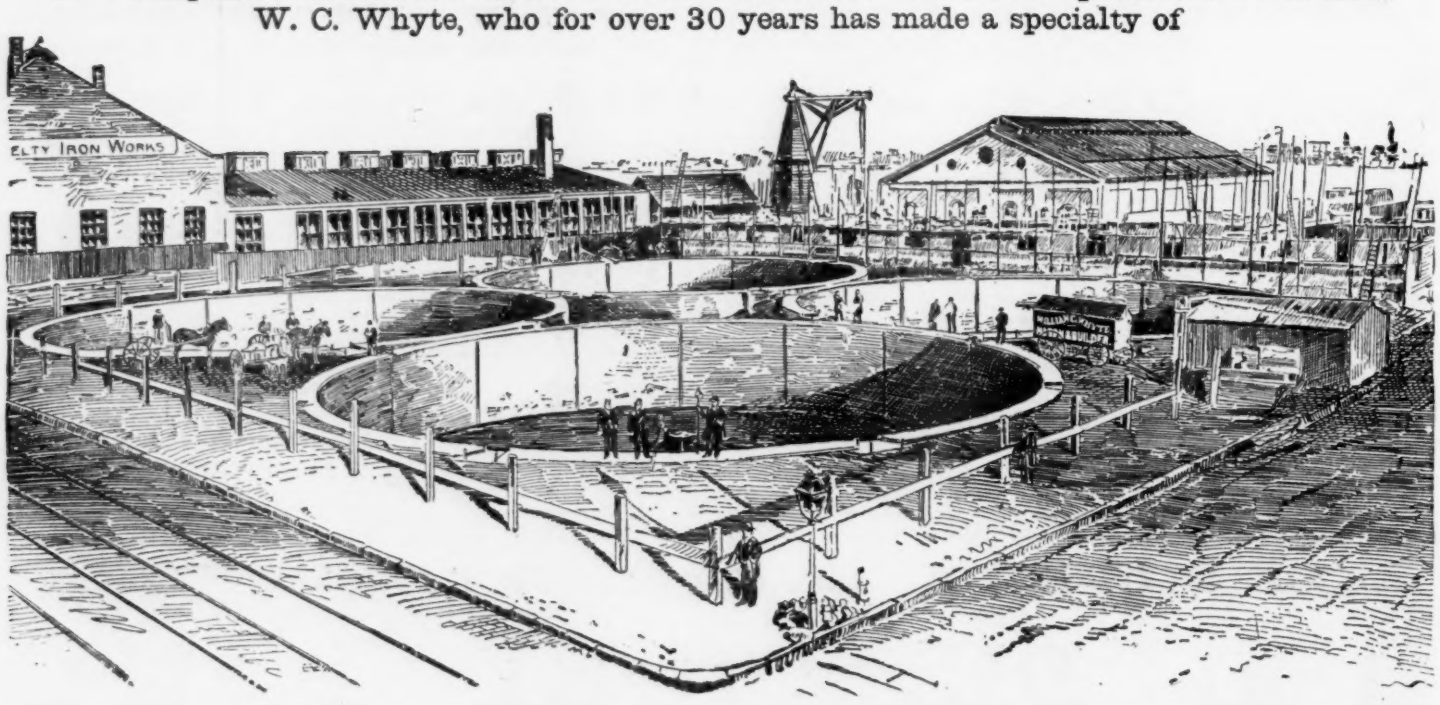
FOR THE "DOUBLE-SUPERHEATER," "JUNIOR," AND OTHER FORMS OF THE

Lowe Water Gas Apparatus.

Full Information Furnished upon Application.

GASHOLDER TANK CONSTRUCTION, ETC.

Gas Companies and others about to erect Gasholders will find it profitable to consult W. C. Whyte, who for over 30 years has made a specialty of



Tank Excavation and Mason Work.

Fifty Tanks now in operation show the sort of work done. Address

W. C. WHYTE, - No. 15 Cortlandt Street, N. Y. City.

WHAT OUR CUSTOMERS SAY OF IRON SPONGE.

COLUMBUS, O. I regard the Connelly Iron Sponge as the best form of oxide of iron of which I have any knowledge.
E. McMILLIN, Eng'r.

OHIO PENITENTIARY, I take pleasure in saying that the Iron Sponge bought of you two years ago, and which has been in constant use ever since, has given entire satisfaction. It does all you claim for it; in fact it reduces the cost of purifying to almost nothing—which certainly ought to be satisfactory. R. P. GREEN, Supt.

CINCINNATI, O. Our experience shows that by the use of Iron Sponge in place of lime we have effected a saving of 1.4 cents per M. in cost of purification. A. HICKENLOOPER, Prest.

SANDUSKY, O. The Iron Sponge has been a great advantage and saving to us over old method. THOS WOOD, Supt.

CADIZ, O. We have been using your Sponge for five years with entire satisfaction, and at about one-fourth the cost when we used lime for purification. A. N. HAMMOND, Supt.

LOGAN O. We have no desire to go back to purification by lime.
A. MICHIE, Sec.

LIMA, O. We have used your Iron Sponge for two years, nothing else, and are entirely satisfied with it. LIMA GAS LT. CO.

TROY, O. Recommend Iron Sponge to any Gas Company. It is as good and far cheaper than lime, and far less labor connected with it. R. A. DITTMAR, Supt.

WOOSTER, O. We have used your Iron Sponge about 8 months with entire satisfaction, and we shall continue to use it as long as we can do so with the success we have had thus far.
WOOSTER GAS LT. CO.

HAMILTON, O. We have been using your Iron Sponge for the past 5 years exclusively—using no lime with it—and it affords us pleasure to testify to its merits. Our present lot has been in use now over 16 months. D. H. HENSLEY, Sec.

MANSFIELD, O. Our Company has been using your Iron Sponge for 2 years in our works for purifying. It has been very satisfactory, and we would not know how to get along without its use.
G. S. HARRIS, Supt.

PORTSMOUTH, O. We have been using your Iron Sponge, and so far *it has given entire satisfaction.* J. W. SMITH, Sec.

PAINESVILLE, O. We have used your Iron Sponge for the past 2 years, and shall continue to use it. *It gives perfect satisfaction.* J. W. ALEXANDER, Prest.

CONNELLY IRON SPONGE AND GOVERNOR CO., No. 111 Broadway, New York.

Wilbraham Bros.,

PHILA., PA.

SOLE MAKERS OF

THE HUNTOON GAS GOVERNOR,

The Best Governor in the Market for Rotary or Steam Jet Exhausters.

Wilbraham Gas Exhausters,

BAKER ROTARY PRESSURE BLOWERS,

And Rotary Piston Pumps.

Catalogues and Prices on Application.

IRON MASS

For Gas Purification.

Acts immediately, and more efficiently than any other purifying agent now in use.

Greenpoint Chemical Works.

JOHN SCHRIEVER, Manager.

Greenpoint Ave. & Newtown Creek, Brooklyn N.Y.

JARVIS ENGINEERING CO.,

61 Oliver St., Boston, Mass.

CONTRACTORS FOR ERECTING

COMPLETE STEAM OUTFITS FOR ELECTRIC LIGHTING STATIONS.

Steel Boilers set with Jarvis Pat. Boiler Setting

To burn **COKE SCREENINGS** for Fuel.

ARMINGTON & SIMS CO. ENGINES,

Belting direct to Dynamos, without using Shafting.

SEND FOR CIRCULARS.

REFERENCES.—Charlestown Gas & Electric Light Co., Charlestown, Mass.; Schenectady Gas & Electric Light Co., Schenectady N. Y.; Brookline Gas Co., Brookline, Mass.

Gasholder Tanks & Gas Works Masonry Complete.

PLANS PREPARED AND ESTIMATES FURNISHED AT SHORT NOTICE.

J. P. WHITTIER, 70 Rush St., near Division Av., Brooklyn, N. Y.

A Large Quantity of Ground Fire Brick For Sale Cheap.

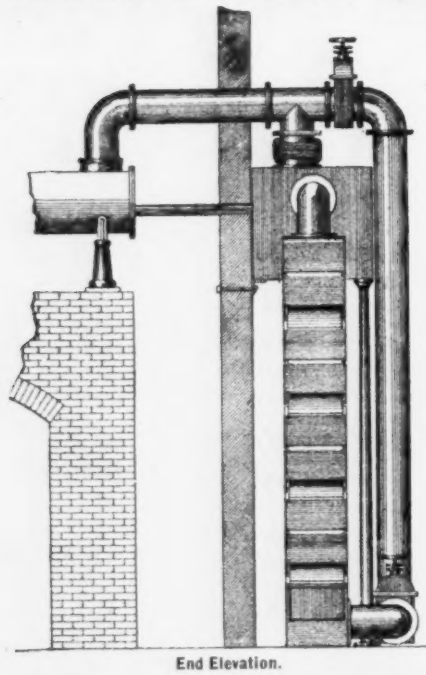
1891 DIRECTORY 1891

OF AMERICAN GAS COMPANIES.

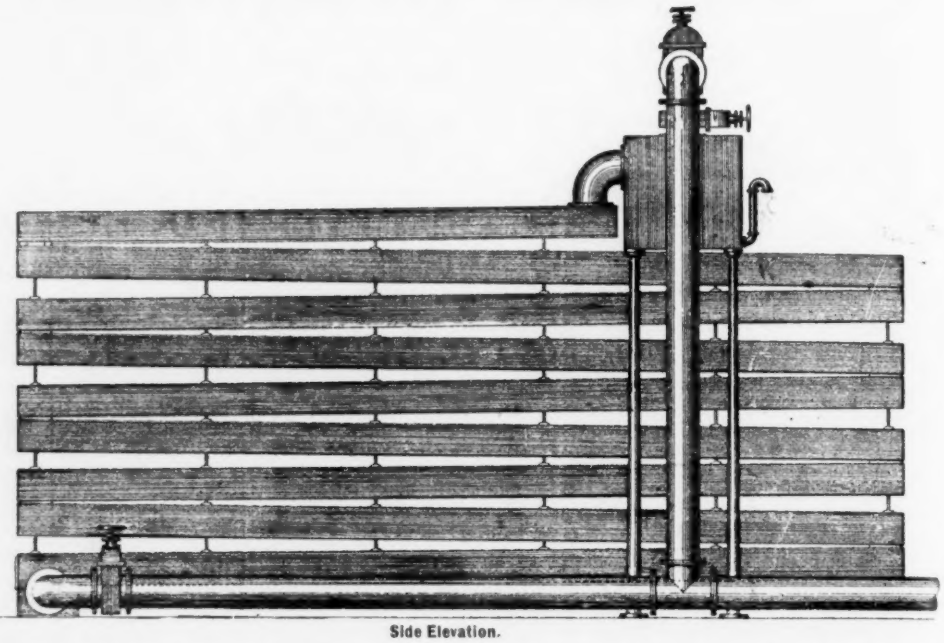
Price, - - - - - - - $5.00.

A. M. CALLENDER & CO., No. 32 Pine Street, New York City.

Wood's Gas Scrubbing and Enriching Apparatus.



End Elevation.



Side Elevation.

The cheapest, simplest, and most effective apparatus for removing Tar and Ammonia, and enriching Gas, ever brought to the attention of Gas Manufacturers. With ordinary condensers and scrubbers the condensable illuminants flow off to the tar wells and liquor tanks and are lost, but with Wood's Apparatus these illuminants are saved and retained in the gas, thus increasing its illuminating power and making a great saving in the cost of enriching material. Where set up next after the Hydraulic main, this Scrubber produces an 8-oz. Ammoniacal Liquor.

JAMES R. FLOYD & SONS, - - Nos. 531 to 543 West 20th Street, N. Y. City.

FORT WAYNE ELECTRIC CO.

FORT WAYNE, IND.

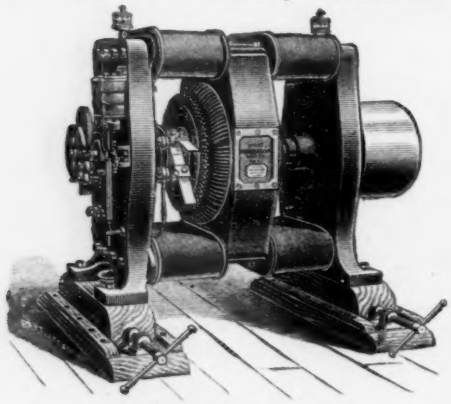
MANUFACTURERS OF THE

Slattery Induction System

—OF—

LONG DISTANCE INCANDESCENT LIGHTING.

The Most Carefully Worked Out and Complete Alternating Current System of Electric Lighting in Existence.



Wood Dynamo.

—AND THE—

WOOD

Automatically Regulating

ARC DYNAMOS AND LAMPS.

Main Office and Factory, Fort Wayne, Ind.

BRANCH OFFICES.

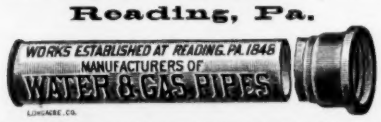
NEW YORK, - - -	115 Broadway.
PHILADELPHIA, - -	907 Filbert Street.
CHICAGO, - - -	185 Dearborn Street.
SAN FRANCISCO, -	35 New Montgomery Street.
BUFFALO N. Y., - - -	228 Pearl Srteet.
PITTSBURGH, PA., - -	533 Wood Street.
DALLAS, TEXAS, - - -	McLeod Building.
TORONTO, CANADA, -	138 King Street, West.
MEXICO, F Adams' Successors, -	City of Mexico.
CUBA, Maicas & CO., - - -	Havana.

ENGINEERS. GAS AND WATER PIPES. GAS AND WATER PIPES.

D. WANNER, Chairman. A. H. MELLERT, Mangr. of Wks.
B. KINSEY, Secretary. F. A. KNOPP, Treasurer.

MELLERT FOUNDRY & MACHINE CO. Ltd. and READING FOUNDRY CO., Ltd.

Reading, Pa.

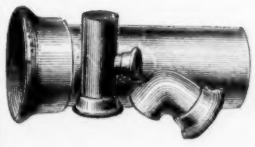


Specials—Flange Pipe, Valves and Hydrants Lamp Posts, Retorts, etc.

General Foundry and Machine Work.

JOHN FOX, Selling Agent. 160 Broadway, N.Y.

WARREN FOUNDRY AND MACHINE CO.,



Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.

CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

THE OHIO PIPE COMPANY,

MANUFACTURERS OF

Cast Iron Gas & Water Pipe,

BRANCH AND SPECIAL CASTINGS.

Gas-House Bench Castings, Hydraulics, Lamp Posts, Flange Pipe and Specials, Architectural Castings, Building Columns, Joists, Cellar Grates, Sash Weights, etc.

GENERAL FOUNDERS AND MACHINISTS.

Columbus, Ohio.

M. J. DRUMMOND,

SPECIAL CASTINGS AND LAMP POSTS.

Office, Corbin Building, 192 Broadway, N. Y.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

THE ADDYSTON PIPE AND STEEL COMPANY:

CAST IRON

PIPE

CINCINNATI, OHIO.

FOR MANUFACTURED AND NATURAL GAS AND WATER.

SPECIALS, FLANGE PIPE, AND LAMP POSTS

JOS. R. THOMAS,

No. 32 Pine Street, N.Y. City.

CONSULTING AND CONSTRUCTING

Gas Engineer and Contractor.

PLANS, SPECIFICATIONS, AND ESTIMATES FURNISHED.

Contracts taken for all Appliances required at a Gas Works,

Either for New Works or Extensions to Old Plants.

JAMES R. SMEDBERG,

Gas Engineer,

213 Jefferson Ave., Peoria, Ill.,

Will furnish Plans, Specifications and Estimates for the Remodeling or extension of Gas Works. Also, Analytic Reports upon the business condition and prospects of Gas Companies. Ample references will be given.

DURAND WOODMAN, Ph.D.,

Analytic and Technical

CHEMIST.

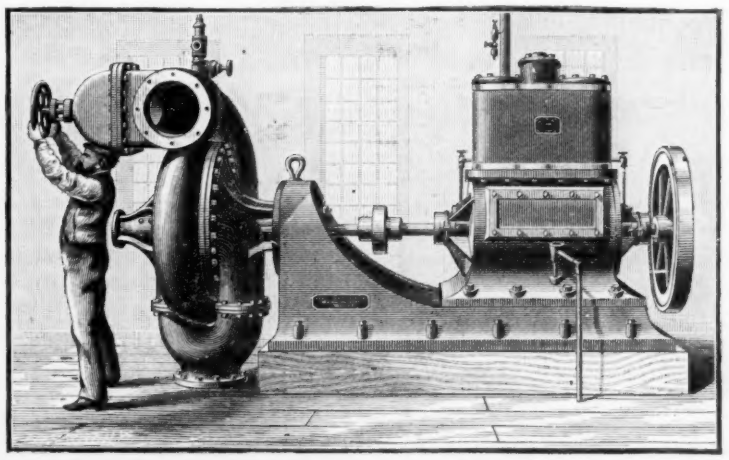
Analyses of Gas, Fuel and Gas Coals, Crude and Refined Petroleum, Materials for Gas Purification, Tar, Ammoniacal Liquors and other Bye-Products, Fire Clays, Deposits in Mains, Water for Steam Making, Boiler Scale, etc., etc. Expert work in connection with "Damages to adjacent water supplies and adjoining properties." Experimental Investigations for Inventors.

127 Pearl Street (Hanover Square), N. Y.

WESTINGHOUSE ENGINES

A SAMPLE INSTALLATION.

Standard Automatic Engine coupled direct to a Centrifugal Pump. Speed 280 Revolutions.



Over 4000 Westinghouse Standard Engines in use.

THE WESTINGHOUSE MACHINE COMPANY.
PITTSBURGH, PENNA. U.S. OF A.

RETORTS AND FIRE BRICK.

J. H. GAUTIER & COMPANY

CORNER OF

GREENE AND ESSEX STREETS,

JERSEY CITY, N. J.

MANUFACTURERS OF

Clay Gas Retorts,

Gas House Tiles,

Fire Bricks, Etc. Etc.

Ground Clay, Fire Brick and Fire Sand in Barrels,

H. GAUTIER, Prest. CHAS. E. GAUTIER, Sec. & Treas.
CHAS. E. GREGORY, V.-Prest. DAVID R. DALY Gen'l Mang'r.

BROOKLYN
Clay Retort & Fire Brick Works,

(EDWARD D. WHITE & CO.)

Manufacturers of Clay Retorts, Fire Brick, Gas House and other Tile.

VAN DYKE, ELIZABETH, RICHARDS & PARTITION STS.

Office, 88 Van Dyke St., Brooklyn, N. Y.

RETORTS AND FIRE BRICK.

LACLEDE FIRE BRICK MFG. CO.,

MANUFACTURERS OF

Fire Brick, Gas Retorts,

AND

ST. LOUIS STANDARD SEWER PIPE.

Blast Furnace and Cupola Linings, every description of Fire Clay Material, Fire Clay Flue Linings, Chimney Tops Dry Milled and Crude Fire Clays, etc.

OFFICE AND DEPOT

901, 903, and 905 Pine Street, ST. LOUIS, MO.

ESTABLISHED IN 1845.

B. KREISCHER & SONS,

OFFICE FOOT OF HOUSTON ST., E.R., N.Y.

Gas Retorts,

TILES, FIRE BRICK.

AND EVERYTHING IN THE FIRE CLAY LINE.

RETORTS AND FIRE BRICK.

MANHATTAN

FIRE BRICK & ENAMELLED CLAY

RETORT WORKS

ADAM WEBER.

CLAY GAS RETORTS AND RETORT SETTINGS

FIRE BRICKS, TILES, ETC.,

Office and Works, 15th Street and Avenue C., N. Y

Works, LOCKPORT STATION, PA.

—ESTABLISHED 1864.—

JAMES GARDNER, JR.,

Successor to WILLIAM GARDNER & SON.

Office, Rooms 19 & 20, Lewis Block PITTSBURGH, PA, P. O. Box 373

Fire Clay Goods for Gas Works.

SOLE REPRESENTATIVE OF THE McILHENNY REGENERATIVE BENCHES FOR THE U. S.

H. A. NORTON, No. 92 WATER STREET, BOSTON, MASS., Agent for the New England States.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.

OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouth-pieces making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

PRICE LIST.

In Casks, 600 to 800 lbs., f.o.b. N. Y., at 5 cents per pound.
In Kegs, 300 to 300 lbs., " " at 6 " "
In Kegs less than 100 lbs., " " at 7 " "

C. L. GEROULD & CO.,

5 & 7 Skillman St., Brooklyn, N. Y.

Western Agt., H. T. GEROULD, Jeffersonville, Ind.

Parker-Russell Mining and Mfg. Co.,

CITY OFFICE,

Mermod-Jaccard Bldg., Rooms 307 & 308, Broadway & Locust St., St. Louis. Mo.

PROPRIETORS OF THE

OAKHILL GAS RETORT & FIRE BRICK W'KS

Our immense establishment is now employed almost entirely in the manufacture of

Materials for Gas Companies

We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We have the *exclusive Agency for the West* of the celebrated

Kloenne-Bredel Full Depth and Semi-Recuperator Benches,

And also furnish and build

Our Own Styles Semi-Recuperator Furnaces for the use of Coal or Coke as fuel.

THOS. SMITH, Prest. AUGUST LAMBLA, Vice-Prest. & Supt.

BALTIMORE
RETORT & FIRE BRICK CO.

MANUFACTORY AT

LOCUST POINT BALTIMORE, MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.

Red and Buff Ornamental Tiles and Chimney Tops. Drain and Sewer Pipe (from 2 to 30 inches). Baker Oven Tiles 12x12x2 and 10x10x2.

WALDO BROS., 88 WATER ST., BOSTON, MASS

Sole Agents the New England States.

Boston Fire Brick Works

Manufacturers of

Gas Retorts and Settings

Under the Personal Supervision of MR. GEO. C. HICKS late of Chicago.

Fire Clay Goods of all kinds. Akron Sewer Pipe, Lime, Cement, etc. Agts. for the Arc Gas Lamp & Governing Gas Burners.

Send for Circulars and Prices to

FISKE, COLEMAN & CO., Managers, No. 62 Congress Street. Boston, Mass

FRED. BREDEL, C. E.,

Contractor for the Complete Erection and Equipment of Gas Works.

Sole Proprietor of the KLOENNE PATENTS for North America.

Gas Condensing and Purifying Machine.

Doing all the Work Between Exhauster & Oxide Purifier.

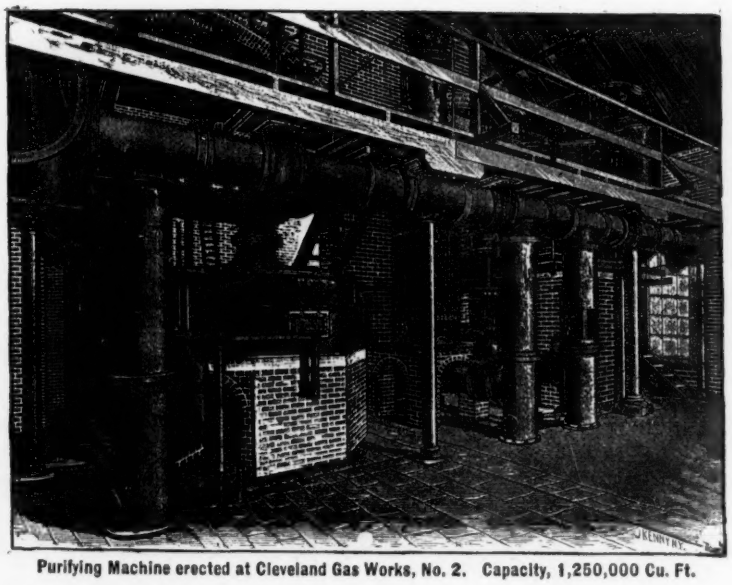
No Condensers Required.

No Naphthaline or Pitch is Formed.

HIGHER CANDLE POWER.

Tar & Ammonia Washers

WATER GAS WASHERS.



Purifying Machine erected at Cleveland Gas Works, No. 2. Capacity, 1,250,000 Cu. Ft.

RECUPERATIVE FURNACES.

Adapted to Retort Houses With or Without Stage Level.

Over 1,400 Retorts Now in Use in America.

Inclined Retort Benches.

Refers, by permission, to Mr. Eugene Vanderpool, Newark, N. J., and Mr. E. G. Cowdery, Milwaukee, Wis.

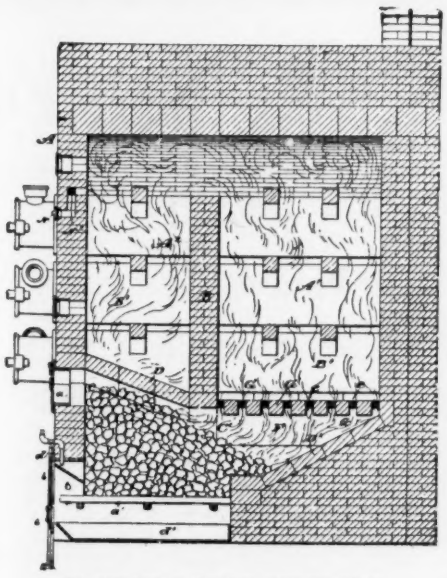
For further information address

FRED. BREDEL,

118 Farwell Ave., Milwaukee, Wis. 22 Beaver St., N. Y. City.

FLEMMING'S

Generator-Gas Furnace



Materials furnished and Benches erected by

J. H. GAUTIER & CO., - Jersey City, N. J.

Address as above, or D. D. FLEMMING, Jersey City, N. J.

AMERICAN GAS LIGHT JOURNAL

$3.00 per Annum.

A. M. CALLENDER & CO.,

32 Pine Street, N. Y.

The Miner Street Lamps.

Jacob G. Miner,

No. 823 Eagle Ave., New York, N. Y.

Bartlett Street Lamp Mfg. Co.

MANUFACTURERS OF

Globe Lamps,

FOR

Streets, Parks, Public Buildings, Railroad Stations, etc.

LAMP POSTS

A Specialty.

Office and Salesroom,

40 & 42 COLLEGE PLACE, - - N. Y. CITY.

Gas Companies and others intending to erect Lamps and Posts will do well to communicate with us.

The American Gas Engineer and Superintendent's Handbook.

By WM. MOONEY.

350 Pages, Full Gilt Morocco. Price. £3.00.

A M. CALLLENDER & CO., 32 Pine St.. N. Y.

DAVIS & FARNUM MFG. CO.,

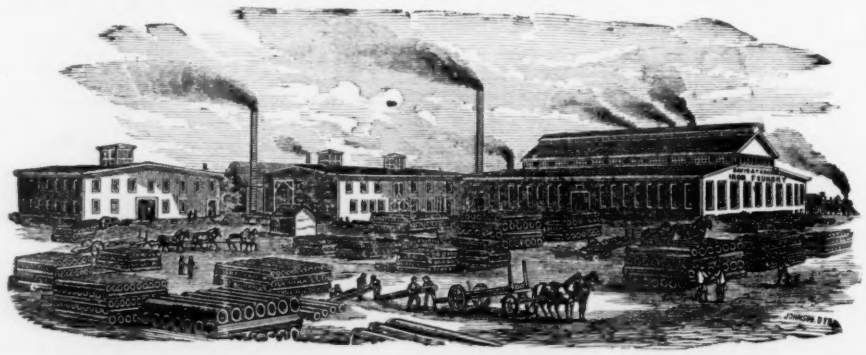
WALTHAM, MASS.

PRINCIPAL OFFICE AND WORKS, Waltham, Mass. BOSTON OFFICE, Room 18, Vulcan Building, 8 Oliver Street

SINGLE, DOUBLE, AND TRIPLE LIFT

Gasholders.

OF ANY CAPACITY.



TUBULAR, PIPE, AND SINUOUS FRICTION

Condensers.

OF ALL SIZES.

IRON ROOF FRAMES AND FLOORS.

Purifying Boxes, Center Seal or Valve Connections, Bench Work.

Reversible Lime Trays.

SELF-SEALING AND PRESSED STEEL MOUTHPIECE LIDS.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Plant.

— ALSO —

Gas and Water Pipe, Flanged Pipe,

Sugar House Work, and Special Castings of all Descriptions.

Established 1861. **Incorporated 1881.**

KERR MURRAY MFG. CO.,

FORT WAYNE, IND.

Those who are in need of

Holders or Gas Works Apparatus of any Description,

AND OF THE LATEST IMPROVEMENTS,

will find it to their interest to

GET AN ESTIMATE FROM US

before placing their order.

As we make a Specialty of this Class of Work, and are Practical Builders and Manufacturers of same,

with our long years of experience in the business,

WE CAN GUARANTEE YOU SATISFACTION.

Estimates, Plans and Specifications Furnished on Application.

BARTLETT, HAYWARD & CO.

Baltimore, Md.

Triple Double, & Single-Lift

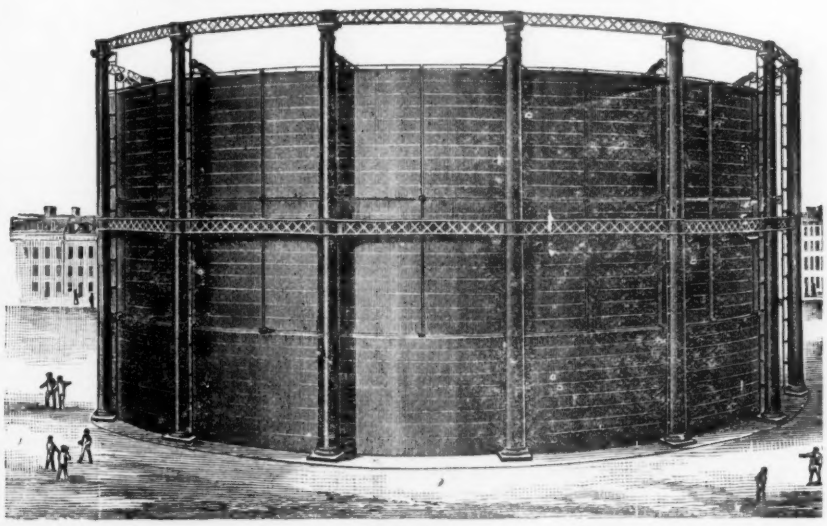
GASHOLDERS.

Iron Holder Tanks.

ROOF FRAMES.

Girders.

BEAMS.



PURIFIERS.

CONDENSERS.

Scrubbers.

BENCH CASTINGS.

OIL STORAGE TANKS.

Boilers.

The Wilkinson Water Gas Process.

THIRTY-CANDLE, NON-CONDENSABLE, FIXED GAS. THE MOST SUCCESSFUL GAS PROCESS IN OPERATION.

Munich Regenerative Furnace, System Drs. Schilling & Bunte.

MILL'S REVERSIBLE LIME TRAYS.

Gas Works Designed and Constructed.

Pascal Iron Works. ESTABLISHED 1821. Delaware Iron Works.

MORRIS, TASKER & CO.,

INCORPORATED.

OFFICE, 224 SOUTH THIRD STREET, - - PHILADELPHIA, PA.

CONTRACTORS, BUILDERS, AND MANUFACTURERS OF

Gas, Water & Sugar Works

Bench Castings.

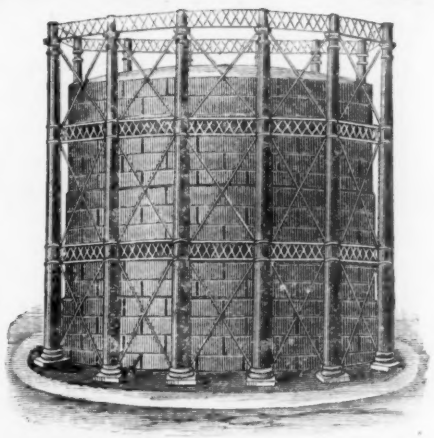
Condensers.

Scrubbers.

Purifiers.

Hyd. Carriages.

Iron Floors,



Iron Roofs.

Street Stops,

Valves, etc.

Stand-Pipes.

Water & Oil

Tanks, all Sizes.

Single, Double, and Triple-Lift Gas Holders.

SELF-SEALING RETORT LIDS. STAMPED STEEL RETORT LIDS.

Locomotive Water Columns, Filters, etc. Boiler Tubes, Wrought Iron Pipe & Fittings

Plans, Specifications and Estimates for all kinds of Machinery furnished on application.

Foundries & Works,
MILLVILLE, FLORENCE,
and CAMDEN, N. J.

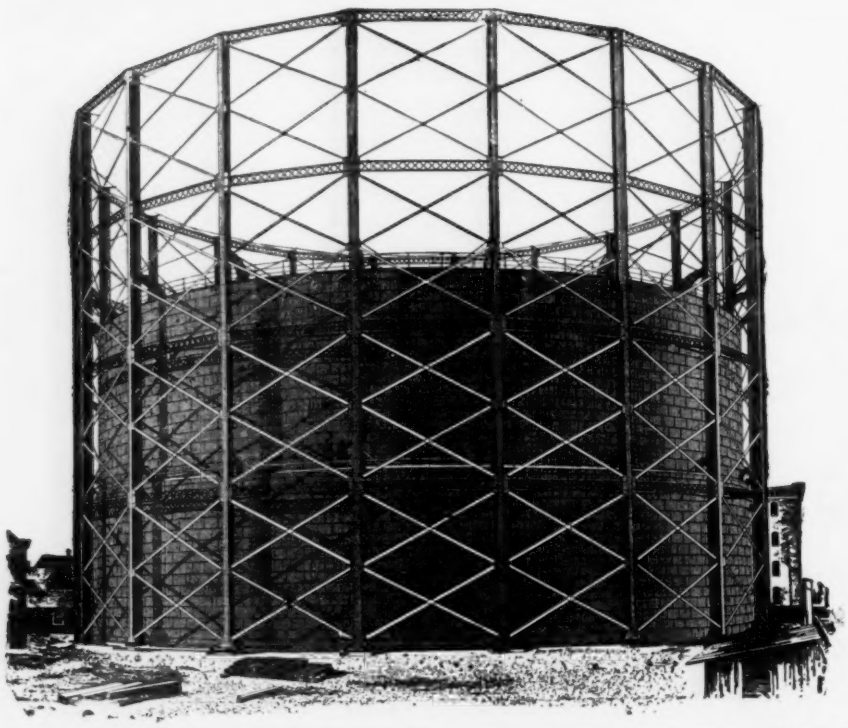
R. D. WOOD & CO.,

Engineers,
Iron Founders,
and
Machinists.

400 Chestnut St., PHILADELPHIA, PA.

MANUFACTURERS OF

CAST IRON PIPE,



Gas Holders,

SINGLE, DOUBLE, AND TRIPLE LIFTS, WITH
OR WITHOUT WROUGHT IRON
OR STEEL TANKS.

PURIFIERS, CONDENSERS.

Scrubbers.

BENCH WORK.

Iron Floors and Roofs, Plate Girders.

Heavy Loam Castings.

HYDRAULIC WORK.

Lamp Posts, Valves, Etc.

ISBELL-PORTER COMPANY,

G. G. PORTER, Prest. (Successors to SMITH & SAYRE MFG. COMPANY) CHAS. W. ISBELL, Secy.

ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

Special Castings, Tees, Bends, etc.
Bench Castings.
Water Gas Generators.
Hydraulic Mains.
Iron Floors.
Brenner Self-Sealing Retort Lids.
Tar Gates and Hydraulic Main Dip Regulators.
Hutchison's Tar Displacement Apparatus.
Multitubular Condensers.
Standard Washer-Scrubbers.
Tower Scrubbers.
Walker's Tar and Carbonic Acid Extractors.

Exhausters.
Engines.
Steam Jet Exhausters.
Exhauster Governors.
Compensators.
Self-Acting Bye-Pass Valves.
Valves.
Valve Stands with Indicators.
Purifying Boxes.
Purifier Valve System.
Center Seals.
Street Governors.

Estimates, Drawings and Specifications Furnished for the Alteration, Improvement, or Extension of Existing Works or the Construction of New Works.

ISBELL-PORTER COMPANY,

No. 245 Broadway, New York City.

GAS WORKS APPARATUS AND CONSTRUCTION. GAS WORKS APPARATUS AND CONSTRUCTION.

JAMES R. FLOYD & SONS,

(SUCCESSORS TO HERRING & FLOYD)

Oregon Iron Works,

W. 20th & 21st. Sts., bet. 10th & 11th Avs.,

NEW YORK CITY.

Engineers and Contractors

FOR THE

CONSTRUCTION OF GAS WORKS.

MANUFACTURERS OF

All Kinds of Castings and General Ironwork

FOR

GAS APPARATUS.

Bench Castings, Regenerative and Half Regenerative Furnace Castings.

Condensers, Scrubbers, Purifiers, Street Drips and Connections,

Valves,

Hydraulic Hoisting Purifier Carriage, Self-Sealing Retort Lids, Improved Valve Stand and Indicator, Seller's Cement.

Plans, Specifications, and Estimates furnished for Construction of New or Alteration of Old Works.

Bouton Foundry Co.,

FOUNDERS AND MACHINISTS,

CHICAGO, ILL.

Gas Works Apparatus,

PURIFIERS, CONDENSERS,

Bench Work

SPECIALS. LAMP POSTS,

SCRUBBERS,

Iron Roofs and Floors.

Plans and Estimates furnished for new works or extensions of old works.

H. RANSHAW, Prest. & Mangr. WM. STACEY, Vice-Prest. T. H. BIRCH, Asst. Mangr. R. J. TARVIN, Sec. & Treas.

STACEY MFG. CO.,

MANUFACTURERS OF

Single and Telescopic Gasholders,

IRON ROOFS, BRIDGES, LAMP POSTS,

Water and Oil Tanks, Coal Elevator Cars,

COKE CRUSHERS, BENCH CASTINGS,

And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works. Rolling Mill Machinery and Heavy Castings a Specialty.

Foundry: 33, 35, 37 & 39 Mill Street.

Wrought Iron Works: 16, 18, 20, 22, 24 & 26 Ramsey Street.

Cincinnati, Ohio.

1842. # DEILY & FOWLER, 1891.

Laurel Iron Works.

Address, No. 39 Laurel Street, Philadelphia, Pa.

BUILDERS OF

GASHOLDERS,

Single and Telescopic.

Holders Built 1885 to 1890, Inclusive

Omaha, Neb.	Port Chester, N. Y.	Paducah, Ky.	Tacony, Pa. (two)	Central Gas Lt. Co., New York City (3d)
Scranton, Pa. (2d)	New Rochelle, N. Y.	Norwich, Conn.	Mount Vernon, N. Y.	Tacoma, Wash.
Long Island City, N. Y.	Salem, N. J. (3d)	Seattle, W. T.	Binghamton, N. Y.	Knoxville, Tenn.
Macon, Ga.	Omaha, Neb. (2d)	San Diego, Cal.	Concord, N. H.	Pottstown, Pa.
York, Pa.	Lynn, Mass. (2d)	Northern Gas Lt. Co., of New York, N. Y.	Dover, Del. (2d)	Victoria, B. C.
Chester, Pa.	Little Rock, Ark.	Westerly, R. I.	Calais, Me.	Vancouver, B. C.
Hazleton, Pa. (2d.)	Irvington, N. Y.	Willimantic, Conn	New London, Conn. (2d)	Charlottesville, Va.
Staten Island, N. Y.	South Boston, Mass.	Montclair, N. J.	West Chester, N. Y.	So. Framingham, Mass.
Saugerties, N. Y.	Rye, N. Y. (2)	Attleboro, Mass.	Bay Shore, L. I.	Woonsocket, R. I.
Clinton, Mass. (Lan. Mills)	Woodstock, Ont.	Santa Cruz, Cal.	Washington, D. C.	Simcoe, Can.
Chattanooga, Tenn.	Malden, Mass.	Erie, Pa. (2d)	Newport, R. I. (2d)	Pittsfield, Mass. (2d)
Galveston, Texas. (3d.)	Staten Island, N. Y. (2d)	West Chester, Pa. (2d	Morristown, N. J.	Chattanooga, Tenn. (2d)
Fort Plain, N. Y.	Woodstock, Ont.	Lancaster, Pa. (3d	Lebanon, Pa	
Brunswick, Ga.	Malden, Mass.		Oakland, Cal.	

PATENTS.

FRANKLIN H. HOUGH

Solicitor of American & Foreign Patents.

925 F. ST., WASHINGTON, D. C.

(NEAR U. S. PATENT OFFICE.)

Personal attention given to the preparation and prosecution of applications for Letters Patent. All business before the U. S. Patent Office attended to for moderate fees. **No Agency in the United States possesses superior facilities for obtaining Patents,** or for ascertaining the patentability of inventions. Copies of patents furnished for 25 cents each. Correspondence solicited.

GREENOUGH'S

"DIGEST OF GAS LAW."

Price, $5.00.

This is a valuable and important work, a copy of which should be in the possession of every gas company in the country, whether large or small. As a book of reference it will be found invaluable. It is the only work of the kind which has ever been published in this country, and is most complete. Handsomely bound. Orders may be sent to

A. M. CALLENDER & CO., 32 Pine St., N. Y.

WM. HENRY WHITE,

No. 32 Pine Street, - - - New York City.

ENGINEER AND CONTRACTOR FOR THE

ERECTION AND EXTENSION OF

GAS, WATER, AND ELECTRIC LIGHT WORKS.

Correspondence with Gas Companies contemplating extending or improving their Plants respectfully invited.

Plans and Estimates Furnished.

GAS COALS. CANNEL COALS. GAS ENRICHERS.

JAMES D. PERKINS. **PERKINS & CO.,** F. SEAVERNS.

228 & 229 Produce Exchange, New York.

Cable Address, "PERKINS, NEW YORK." Post Office Box 3695, New York.

GENERAL SALES AGENTS FOR

The Youghiogheny River Coal Company's

OCEAN MINE YOUGHIOGHENY GAS COAL.

HON. W. L. SCOTT, Prest. M. H. TAYLOR, Vice-Prest.

This Colliery is located at **SCOTT HAVEN, PA.**, in the center of the Youghiogheny Gas Coal District, and produces the **ONLY RELIABLE YOUGHIOGHENY COAL** for gas purposes. (See Map on p. 87 of this JOURNAL, Feb. 16, '85.)

POINTS OF SHIPMENT,

Locust Point, BALTIMORE. Pier No. 62, PHILADELPHIA.

ST. GEORGE, STATEN ISLAND, N. Y. HARBOR.

Also, Shippers of the following well-known Cannels:

Breckenridge & Old Kentucky Boghead from Kentucky,

AND THE

JELLICO CANNEL, from TENNESSEE.

Within the past four years we have delivered these Cannels to over One Hundred and Fifty Gas Companies in Thirty-five Different States, and to some of the largest Gas Companies in

GREAT BRITAIN, ON THE CONTINENT, AND SOUTH AMERICA.

Single carloads or more delivered at any required point in the United States and Canada Cargo shipments from

NEW YORK, PHILADELPHIA, BALTIMORE, NORFOLK, AND NEWPORT NEWS.

Particulars as to prices, etc., furnished upon application to the above address.

JAMES & WILLIAM WOOD,

Gas and Cannel Coal Contractors,

No. 40 St. Enoch Sq., Glasgow. No. 2 Talbot Court, London.

Proprietors of the **BATHVILLE COLLIERIES** (which produce the celebrated **BOGHEAD CANNEL**), Shields, Shieldmuir, Drumpeller, and other Collieries. This Firm offer

STANDARD CANNELS,

Unequaled as Gas Enrichers.

Analyses, prices, and all further information furnished on application to

Agency for U. S., Room 70, Nos. 2 & 4 Stone St., N.Y. City.

Established 1860

CAESAR BROS.,

MANUFACTURERS OF

ENAMELED

Gas, Water Meter, and Clock

DIALS.

ALSO,

Enameled Iron Plates in Colors, and the Patent Enameled Letters and Numbers.

We make a specialty of this class of work, and, with our long experience of over 30 years, can guarantee not only satisfaction and correctness, but extremely low quotations. ESTIMATES AND SAMPLES FURNISHED ON APPLICATION.

Office & Salesrooms, 11 Park Row, N. Y.

Factory, 153, 155, 157, 159 West Avenue, Hunters Point, L. I., N. Y.

COKE CRUSHERS. GAS COALS. GAS COALS.

The Despard Gas Coal Co.,

MINERS AND SHIPPERS OF

DESPARD GAS COAL,

AND MANUFACTURERS OF

COKE.

MINES, Clarksburg, Harrison Co., W. Va.
WHARVES, Locust Point, Baltimore, Md.
OFFICE, 44 South Street, Baltimore, Md

ROUSSEL & HICKS, 71 Broadway, N. Y. } *AGENTS.* { BANGS & HORTON, 60 Congress St., Boston.

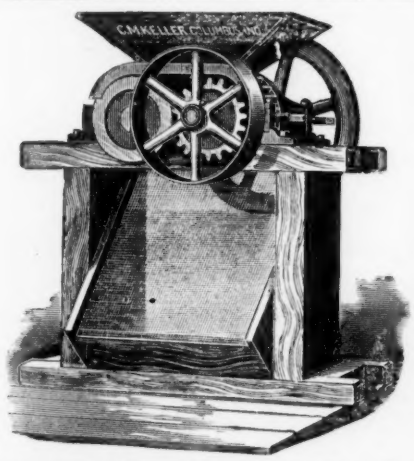
COXE BROS. & CO.

Cross Creek, Sugar Loaf & Beaver Meadow Lehigh Coals.

General Office, 143 Liberty St., New York.

Boston, 70 Kilby Street; Phila., 420 Walnut Street; Chicago, "The Rookery"; Buffalo, Coal and Iron Exchange; Milwaukee, 91 Michigan Street.

E. B. ELY, Gen'l Agent.



Keller's Adjustable Coke Crusher

SIMPLE, STRONG, AND DURABLE.

C. M. Keller, Sec. & Supt. Gas Lt. & Coke Co. Columbus, Ind

Correspondence Solicited.

Electric Light Primer.

By CHARLES L. LEVEY.

A simple and comprehensive Digest of all the most important facts connected with the running of the Dynamo and Electric Lights, with Precautions for Safety, etc.

Price, 50 cents.

A. M. CALLENDER & CO., 32 Pine St., N.Y.

THE PENN GAS COAL CO.

OFFER THEIR

Coal, Carefully Screened & Prepared for Gas Purposes

Their Property is located in the Youghiogheny Coal Basin, near Irwin and Penn Stations on the Pennsylvania Railroad, and on the Youghiogheny River.

Principal Office:

209 SOUTH THIRD STREET, PHILA., PA.

Points of Shipment:

Pennsylvania Railroad Piers; Greenwich Wharves, Delaware River; Pier No. 1 (Lower Side), South Amboy, N. J.

Chesapeake & Ohio Railway Coal Agency,

FOR THE SALE OF THE

Superior Kanawha Gas Coals, Cannelton Cannel,

Also, SPLINT AND STEAM COALS.

From the Kanawha and New River Regions, on the line of the Chesapeake & Ohio R'way.

C. B. ORCUTT, General Agent, - - No. 1 Broadway (Room 217) New York City

EDMUND H. MCCULLOUGH, Prest. CHAS. F. GODSHALL, Treas. H. C. ADAMS, Sec.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Penn.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa

THE CLERK GAS ENGINE CO.,

Main Office, 1012, 1014, 1016, 1018 Filbert St., Philadelphia, Pa.

WM. W. GOODWIN, Prest. **E. STEIN, Sec.**

The utility and convenience of the Gas Engine being no longer an open question, it only remains now for intending purchasers to select the BEST. We claim for the CLERK GAS ENGINE that it is equal to any other manufactured as regards steadiness in running, simplicity, and ease of keeping in repair, and that it gives the greatest amount of power for the least money (both in first cost and expense of running) of any engine made. In support of this claim we refer to the test of the Gas Engines made under the direction of the American Institute of New York in December, 1885, and heretofore published in these columns. These engines are especially adapted for continuous running under heavy loads, and we can refer to Engines which have run 22 hours a day for months at a time

Made in Sizes of 5 10. 15 20. and 25 Horse Power. All Engines Guaranteed for One Year.

JOHN J. GRIFFIN & CO.,

Nos. 1513, 1515, 1517 & 1519 Race Street, PHILADELPHIA.
52 Dey St., NEW YORK. 75 N. Clinton St., (FRED. R. PERSONS, Mangr.) CHICAGO.

MANUFACTURERS OF

METERS FOR MEASURING GAS

IN ANY VOLUME.

Provers, Gauges, Registers, Etc., Etc.

EXPERIMENTAL APPARATUS FOR QUANTITATIVE AND QUALITATIVE ANALYSIS.

Careful and Prompt Attention paid to Repairing of all kinds of Meters and Apparatus.

Estimates Cheerfully Furnished.

Dry Gas Meters.

With 40 years' experience and the best facilities for manufacturing, is enabled to furnish reliable work and answer orders promptly.

NATHANIEL TUFTS,

No. 153 Franklin Street, Boston, Mass.,

MANUFACTURER OF

DRY GAS METERS.

Station Meters of any Capacity.

Test and Experimental Meters, Pressure Registers, Pressure Gauges Pressure and Vacuum Gauges.

METER PROVERS, PHOTOMETERS, STREET LANTERNS, ETC., ETC.

Patent Cluster Lanterns for Street Illumination.

CHARLES E. DICKEY. JAMES B. SMALLWOOD. CHARLES H. DICKEY.

THE MARYLAND METER AND MANUFACTURING CO.

Established 1866.

BALTIMORE, North & Saratoga Sts. **CHICAGO, 122 & 124 Michigan St.**
NEW YORK, 838 Broadway. **SAN FRANCISCO, 221 Front St.**
BOSTON, 92 Water Street, Rooms 21 and 22.

CONSUMERS' & STATION METERS, PRESSURE GAUGES, Etc., Etc.

"Success" and "Perfect" Gas Stoves.

A. HARRIS. E. L. HARRIS. J. A. HARRIS.

Established 1849.

HARRIS BROS. & CO.,

Twelfth and Brown Streets, Philadelphia.

Manufacturers of Wet and Dry Gas Meters,

STATION METERS, METER PROVERS,

EXPERIMENTAL METERS, SHOW OR GLAZED METERS,

Pressure and Vacuum Registers, Gauges, Photometers, Drip and Bell Pumps, Etc., Etc.

PROMPT ATTENTION GIVEN TO ALL ORDERS. METERS THOROUGHLY REPAIRED. ESTIMATES FURNISHED FOR STATION METERS OF ALL SIZES. CORRESPONDENCE SOLICITED.

GAS METERS. GAS METERS. GAS METERS.

GEO. J. McGOURKEY, Prest. WM. H. McFADDEN, Vice-Prest. (Phila.) WM. N. MILSTED, Gen. Supt. and Treas. (New York). WM. H. DOWN, Sec.

THE AMERICAN METER CO.

Established 1834. Incorporated 1863.

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTER VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR & JET PHOTOMETERS.

Manufactories:
512 West 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES.
SUGG'S "STANDARD" ARGAND BURNERS,
SUGG'S ILLUMINATING POWER METER,
Wet Meters, with Lizar's "Invariable Measuring" Drum.

Agencies:
177 Elm Street, Cincinnati.
244 & 246 N. Wells Street, Chicago.
810 North Second Street, St. Louis.
222 Sutter Street, San Francisco.

HELME & McILHENNY,

(Established 1848.)

GAS METER MANUFACTURERS,

Nos. 1339 to 1349 Cherry Street, Philadelphia, Pa.,

WET AND DRY GAS METERS. STATION METERS, EXPERIMENTAL METERS, METER PROVERS,

Center Seals, Pressure Registers, Governors, Indicators, Photometers, and all other kinds of Apparatus for use in Gas Works.

FOULIS' PATENT STATION AND DISTRICT GOVERNORS.

REPAIRING DEPARTMENT.—We employ a special force of skilled workmen repairing meters of **all makers.**

D. McDONALD & CO.,

GAS METER MANUFACTURERS.

(Established 1854.)

51 Lancaster St.. Albany, N. Y. 34 & 36 West Monroe St., Chicago. Ill.

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS, PRESSURE GAUGES, ETC.

We use only the very best materials, and employ the most skilled labor, and by our long experience (37 years) and personal supervision of every deta we feel justified in assuring the public that our goods will give perfect satisfaction. Every Meter emanating from our establishment will bear the Sta Inspector's Badge, and will be fully warrented by us. Our Annual and Calendar will be sent to Gas Companies upon applicatio.

Other people have found us to
their advantage.
We'll be glad to serve you.

STATION METERS.
METER PROVERS.
CONSUMERS' METERS
REPAIRING.

GAS INTO POWER,

BY THE

OTTO GAS ENGINE.

GAS POWER.—A Source of Revenue to Gas Companies ready to engage in Electric Lighting, building of Water Works, Electric Street Railways, etc.

Coal for producing Gas is less in amount than that for producing Steam, both being measured on an equal amount of work performed. And, further, with Gas,

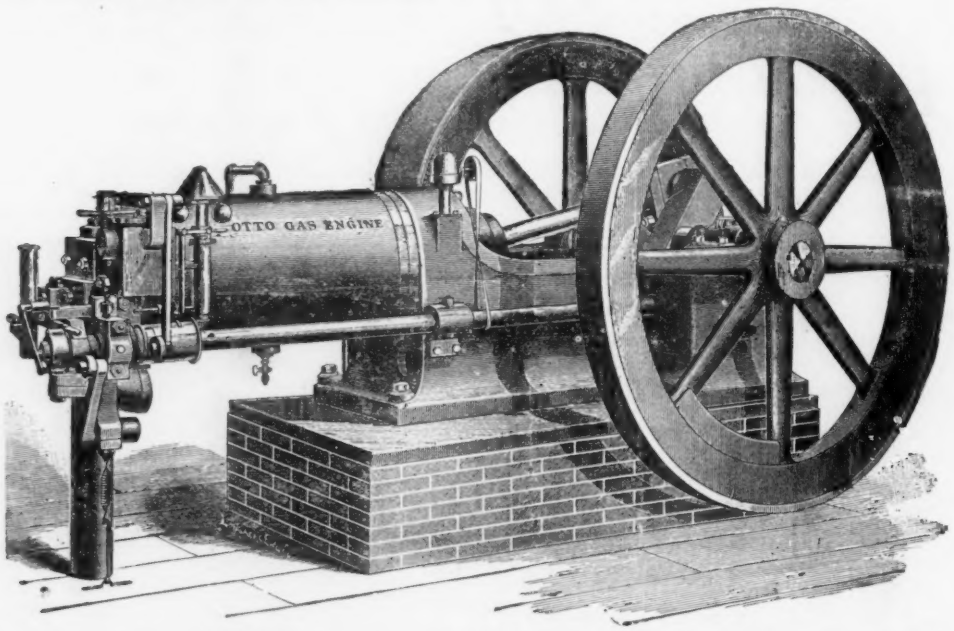
50 to 90 per Cent. of Value of Coal is Returned

by sale of Coke and Tar, according to the market value of these products.

Labor for handling fuel is **reduced,** by its becoming centralized and confined to the gas house and frequently has not increased after the addition of a power station.

With Gas Power, **cost of fuel** is strictly **limited** to the time of use.

MANY VALUABLE AND RECENT IMPROVEMENTS.



SIZES 1-3 to 100 HORSE POWER.

Wherever Gas Companies tried Gas Power with Steam Power together in one Station, the use o Steam was subsequently abandoned or restricted, and Gas Power made to take its place.

Where Gas Companies adopt Gas Power for Electric Plants, Water Works, Sewerage, etc., they not only choose **the most economical power for their use,** but secure to themselves the **numerous advantages of increased production,** without increase of expense, and benefit thereby their entire manufacture. They induce consumers, by their example, to abandon Steam for Gas Power, and, by establishing special rates, make

Gas Power the Leading Power of To-Day,

AND SOLVE AT ONCE THE QUESTION OF FUEL GAS.

"Otto Gas Engine Works,"

SCHLEICHER, SCHUMM & CO.,

151 Monroe St. (Kent Building), Chicago. **33d and Walnut Sts., Phila.**

NEW YORK AGENCY. 18 VESEY STREET.